GPlates User Documentation

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Introduction to GPlates

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1. Introducing GPlates

GPlates is desktop software for the interactive visualisation of plate-tectonics.

GPlates offers a novel combination of interactive **plate-tectonic reconstructions**, geographic information system (GIS) functionality and raster data visualisation. GPlates enables both the visualisation and the manipulation of plate-tectonic reconstructions and associated data through geological time. GPlates runs on **Windows**, **Linux** and **MacOS X**.

1.1. What is a Plate-Tectonic Reconstruction

The motions of tectonic plates through geological time may be described and simulated using **plate-tectonic reconstructions**. Plate-tectonic reconstructions are the calculations of the probable positions, orientations and motions of tectonic plates through time, based upon the relative (plate-to-plate) positions of plates at various times in the past which may be inferred from other data. Geological, geophysical and paleo-geographic data may be attached to the simulated plates, enabling a researcher to trace the motions and interactions of these data through time.

1.2. The Goals of GPlates are:

- to handle and visualise data in a variety of geometries and formats, including raster data
- to link plate kinematics to geodynamic models
- to serve as an interactive client in a grid-computing network
- to facilitate the production of high-quality paleo-geographic maps.

2. What can GPlates Do?

As of GPlates 0.9.4, GPlates functionality includes:

Loading and Saving Data:

- loading geological feature data from the following formats:
  - GPML / compressed GPML

    - Plates4 line-format
    - ESRI Shapefile (including the ability to map shape attributes in a Shapefile to feature properties in GPlates on a user-specified, per-Shapefile basis)
- loading reconstruction poles (finite rotations which enable geological features to be reconstructed through geological time) from the following formats:
    - GPML / compressed GPML
    - Plates4 rotation-format
- loading raster images in JPEG format, including time-sequences of raster images, to enable visualisation of “gridded” geophysical data such as mantle density anomalies, mantle convection-driven dynamic surface topography and the crustal age or spreading rate of the ocean floor —
    - both global raster images, which are assumed to cover the whole globe, from -180 to +180 degrees longitude and -90 to +90 latitude
    - and smaller rasters with a user-specified surface extent
- saving geological feature data in the following formats:
    - GPML / compressed GPML
    - Plates4 line-format
    - GMT “xy” format, with a variety of options for headers
- saving reconstruction poles in the following formats:
    - GPML / compressed GPML
    - Plates4 rotation-format

3. GPlates Development

GPlates is developed by an international team of scientists and professional software developers and post graduates at:

- the EarthByte Project (part of the AuScope National Collaborative Research Infrastructure Strategy (NCRIS) Program) in the School of Geosciences at the University of Sydney (under the direction of Prof. Dietmar Müller)
- the Division of Geological and Planetary Sciences at CalTech (under the direction of Prof. Michael Gurnis)
- the Center for Geodynamics at the Norwegian Geological Survey (NGU) (under the direction of Prof. Trond Torsvik).

Collaborating scientists at the University of Sydney, the Norwegian Geological Survey and CalTech have also been compiling sets of global data for plate boundaries, continental-oceanic crust boundaries, plate rotations, absolute reference frames and dynamic topography.

GPlates is free software (also known as open-source software), licensed for distribution under the GNU General Public License (GPL), version 2.

4. The Aim of this Manual

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Introducing The Main Window

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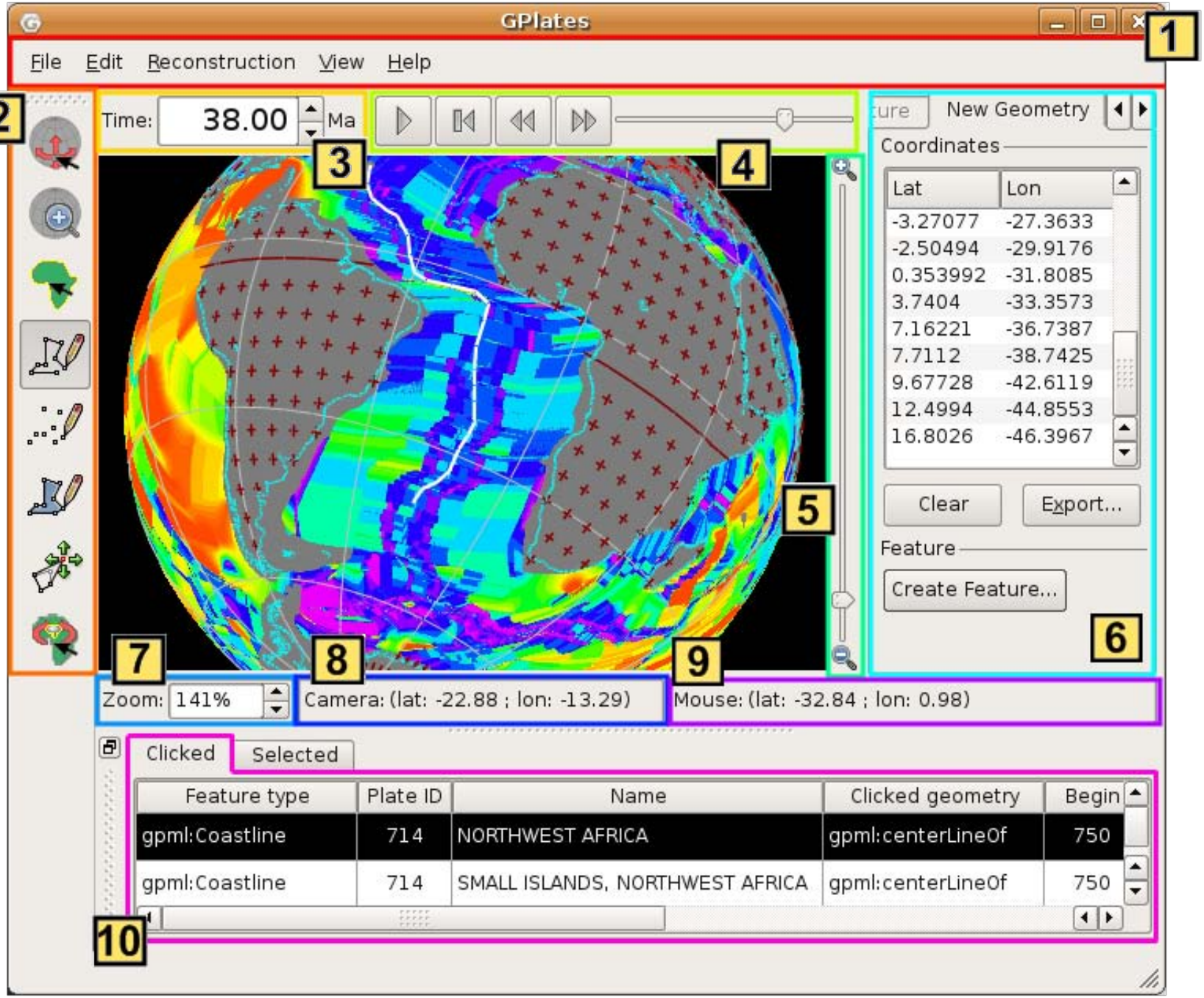
This section describes the **Main Window**, the heart of the GPlates user interface. Below we present annotated screenshots of GPlates, and label the key areas of the window, and provide a brief overview of each.

1. The Main Window

When you start GPlates, the first window you will encounter is the **Main Window**. This contains your view of the globe, and is the starting-point of all tasks within GPlates. It is here that you can control your view of the globe, choose your reconstruction time, load and unload data, and interact with geological features.


GPlates
File
Edit
Reconstruction
View
Help
Time:
38.00
Ma
New Geometry
Coordinates
Lat
Lon
-3.27077
-27.3633
-2.50494
-29.9176
0.353992
-31.8085
3.7404
-33.3573
7.16221
-36.7387
7.7112
-38.7425
9.67728
-42.6119
12.4994
-44.8553
16.8026
-46.3967
Clear
Export...
Feature
Create Feature...
Zoom:
141%
Camera: (lat: -22.88 ; lon: -13.29)
Mouse: (lat: -32.84 ; lon: 0.98)
Clicked
Selected
Feature type
Plate ID
Name
Clicked geometry
Begin
gpml:Coastline
714
NORTHWEST AFRICA
gpml:centerLineOf
750
gpml:Coastline
714
SMALL ISLANDS, NORTHWEST AFRICA
gpml:centerLineOf
750
1
2
3
4
5
6
7
8
9
10

Item	Name	Description
1	Menu Bar	This region of the Main Window contains the titles of the menus.
2	Tool Palette	A collection of tools which are used to interact with the globe and geological features via the mouse pointer.
3	Time Controls	A collection of user-interface controls for precise control of the reconstruction time.
4	Animation Controls	A collection of tools to manipulate the animation of reconstructions.
5	Zoom Slider	A mouse-controlled slider which controls the zoom level of the Globe View camera. 6 Task Panel Task-specific information and controls which correspond to the currently-activated tool.
7	Zoom Control	A user-interface control for precise manipulation of the Globe View camera zoom.
8	Camera Coordinate	An information field which indicates the current globe position of the Globe View camera.
9	Mouse Coordinate	An information field which indicates the current globe position of the mouse pointer.
10	Clicked Geometry Table	Displays a summary of each geometry or feature touched by the last mouse click.

2. Reconstruction View

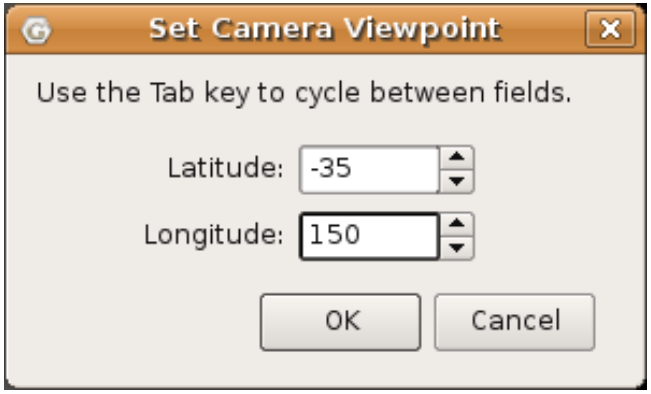
The reconstruction view provides the user with a display of their data on the GPlates globe or map reconstructed to a moment in time. Control of the current reconstruction time, is located under the menu bar on the left, (see image below). The time can be controlled by both a text field, forwards and backwards time buttons, and the animation slider. In addition the shortcut Ctrl+T to enter a time value in the text field.

ReconstructionViewFeb.png[]

2.1. Camera Control

When the (Re-Orient Globe tool), is activated the GPlates globe can be rotated freely using the mouse with a simple click and drag motion. If another tool is selected the globe can still be dragged by holding down Ctrl.

If the user wishes to adjust the camera position to a particular latitude and longitude, pressing Ctrl+L will pop up a window allowing manual entry of coordinates.



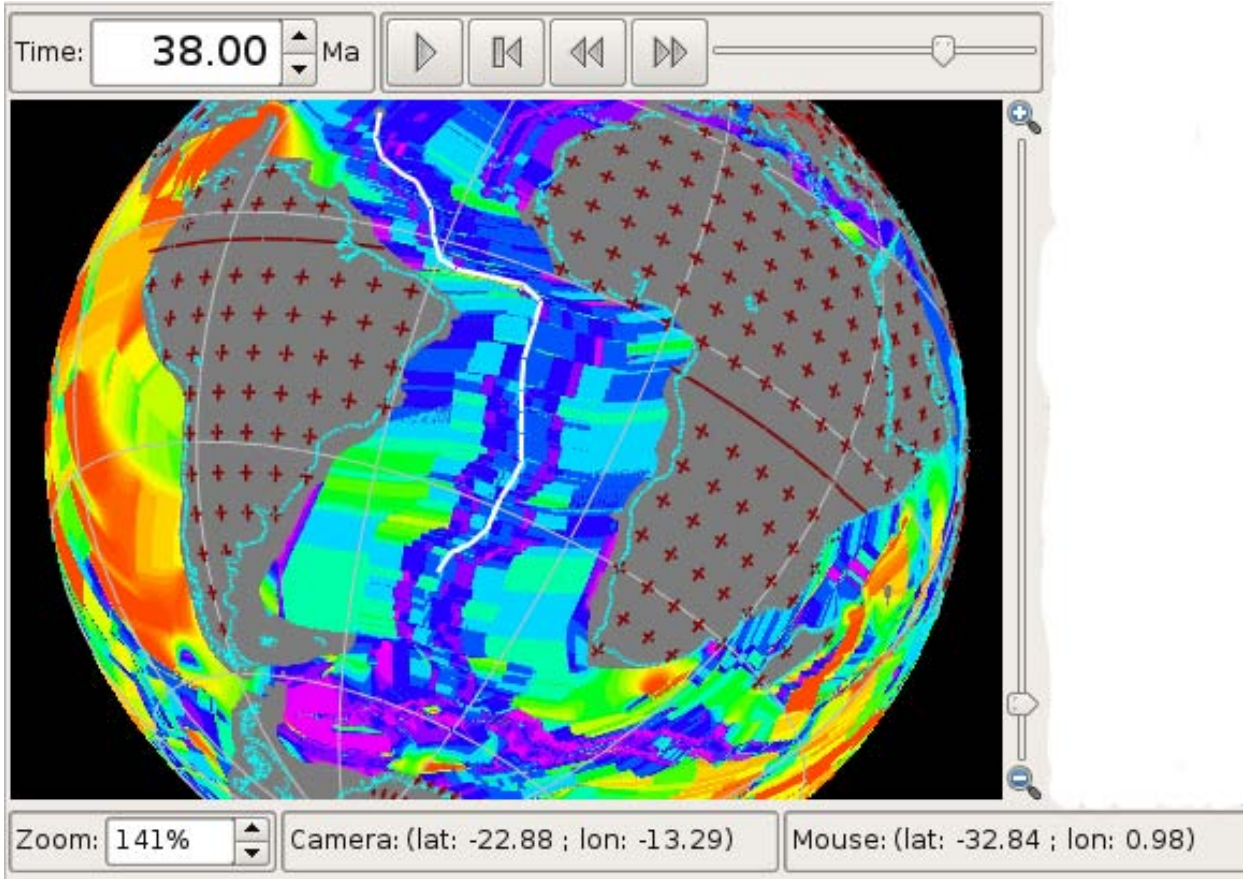
Zooming in or out of the globe can be controlled by a text field, i.e. you type in a desired zoom (between 100% and 10000%).

The amount of zoom can be controlled by the following buttons:

- Zoom In
- Zoom Out
- Reverts globe back to a 1:1 scale.

In addition to the icons and text field GPlates provides a zoom slider, which works on a logarithmic scale. AS well as the scroll feature on the computer mouse.

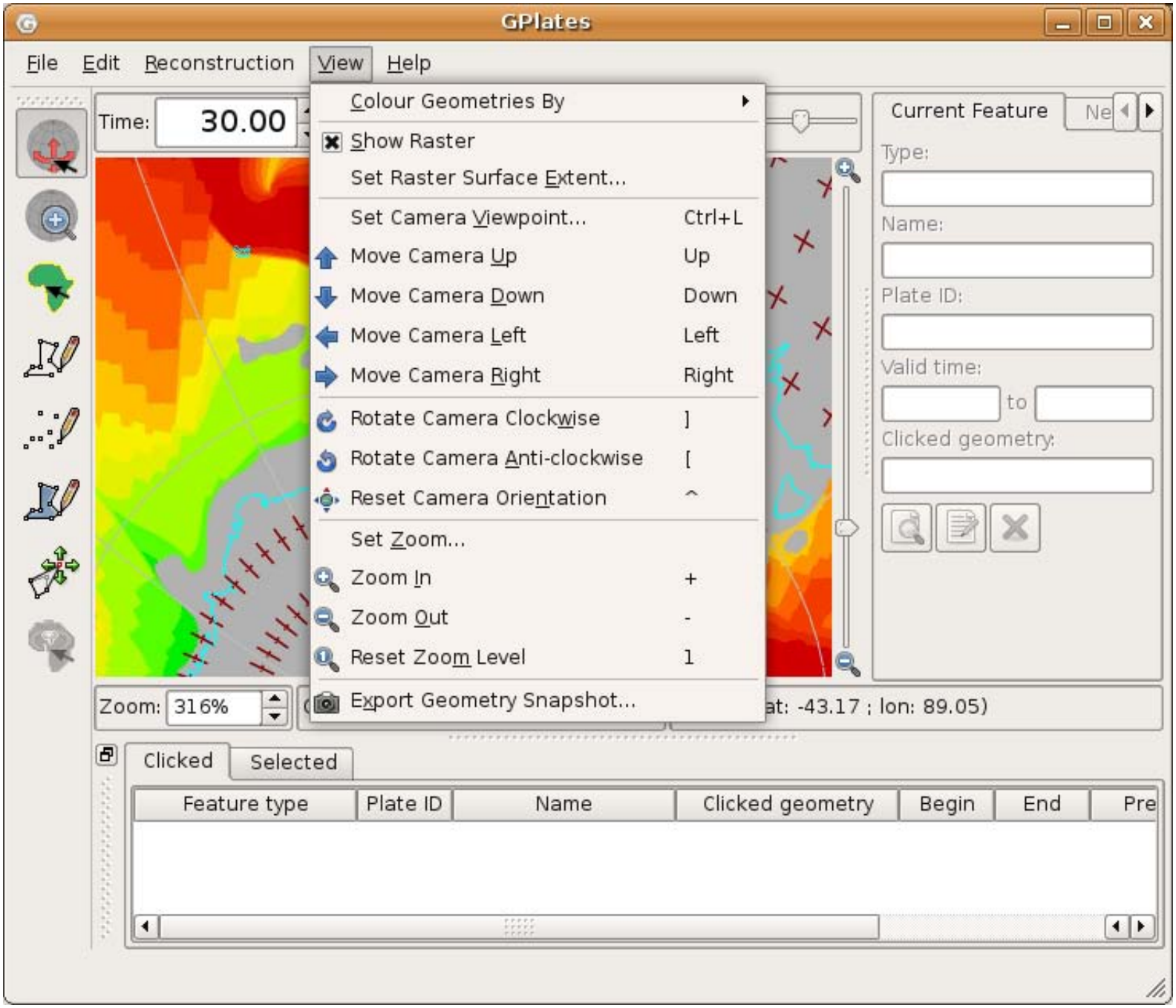
The position of the camera and mouse pointer are provided on the bottom left and right of the reconstruction view respectively.



3. The Main Window with View Menu Open

Each item in a menu is an operation. Related operations are grouped into menus, with the menu title indicating the common theme. For example, the **View Menu** in the image below contains operations which manipulate the user's view of the globe. Within a menu, similar operations are grouped visually by horizontal lines or within sub-menus. In the **View Menu** below, the camera-motion controls are grouped into sub menus and the **Colour Geometry By** operations are accessed in their own sub-menu.

In the **View Menu** and **Colour Geometry By** sub menu, check boxes are displayed to *switch* or *choose* operations. For example; **Show Rasters** and **Colour Geometry By**, will be activated by a small cross or tick that will be displayed in the box in the menu when selected.



4. Tool Palette

The tool palette is used to control your view and interaction with the GPlates globe and maps. You may recognise the concept of tools from graphics editing

software (e.g. drawing tools in Photoshop) or GIS software (e.g. ArcGIS mapping tools).

The Tool Palette includes camera positioning tools, feature selection tools and drawing tools. A tool is activated by clicking on it; only one tool can be active at any time. The task panel will reflect the current tool that is activated.

Item	Tool	Shortcut	Operation
	Drag Globe	D	Drag to re-orient the globe. Shift+drag to rotate the globe
	Zoom In	Z	Click to zoom in. Shift+click to zoom out. Ctrl+drag to re-orient the globe
	Choose Feature	C	Click a geometry to choose a feature. Shift+click to query immediately. Ctrl+drag to re-orient globe
	Digitise Polyline Geometry	L	Click to draw a new vertex. Ctrl+drag to re-orient the globe
	Digitise Multi-point Geometry	M	Click to draw a new point. Ctrl+drag to re-orient the globe
	Digitise Polygon Geometry	G	Click to draw a new vertex. Ctrl+drag to re-orient the globe
	Modify Reconstruction Poles	R	Drag or Shift+drag the current geometry to modify its reconstruction pole. Ctrl+drag to re-orient the globe
	Move Vertex	V	Drag to move a vertex of the current feature. You can still drag the globe around by holding down Ctrl

5. List of Menu Operations

- *Tables of shortcuts and accelerators can be found in Appendix A of the user manual*
- *A description of the operations within each menu will be explained in further detail in their respective chapters*

5.1. File

- Open Feature Collection
- Open Global Raster
- Open Time Dependent Global Raster Set

- View Read Errors
- Manage Feature Collections
- Quit

5.2. Edit

- Query Feature
- Edit Feature
- Undo
- Redo
- Clear Selection

5.3. Reconstruction

- Reconstruct to Time
- Increment Reconstruction Time
- Decrement Reconstruction Time
- Animate
- Specify Fixed Plate
- View Total Reconstruction Poles

5.4. View

- Colour Geometries By
    - Plate ID
    - Single Colour
    - Feature Type
    - Feature Age
- Show Raster
- Set Raster Surface Extent
- Set Camera Viewpoint

- Move Camera Up
- Move Camera Down
- Move Camera Left
- Move Camera Right
- Rotate Camera Clockwise
- Rotate Camera Anti-clockwise
- Reset Camera Orientation
- Set Zoom
- Zoom In
- Zoom Out
- Reset Zoom Level
- Export Geometry Snapshot

5.5. Utilities

- Total Reconstruction Poles

5.6. Help

- About

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Data File Types

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1. Introduction

This chapter endeavours to give the user an understanding of visualisation techniques within GPlates; which image formats are able to be loaded into GPlates and how to go about doing this.

2. Rasters in GPlates

GPlates has the facility to display raster images on the globe.

2.1. What are raster images?

A *raster image* is one formed by a 2-dimensional rectangular grid coloured points. A single point of colour in the raster image is known as a *pixel*. Each pixel is positioned at one of the grid-points, and every grid-point has a pixel positioned on it.

The ability to display raster images on the globe enables the user to superimpose any kind of imagery or gridded data (such as satellite imagery, topography, bathymetry etc) on the surface of the globe, to be viewed at the same time as reconstructible features. (Note that GPlates is not yet able to reconstruct raster images).

2.2. Which image formats does GPlates understand?

GPlates is able to display global (covering the whole globe) and regional (covering a user-specified zone) raster images. GPlates assumes that a global image spans the longitude range of -180 degrees to +180 degrees and the latitude range of -90 to +90 degrees, and positions the image accordingly. For regional rasters a surface extent of any longitude and latitude range for the raster can be specified, enabling rasters of a smaller size to be correctly sized and positioned.

GPlates reads images in the widely-used JPEG image format (without the need for it to be geo-referenced), enabling the creator of an image to choose the amount of image compression used, and thus control the size of the image file created.

2.3. How do I load a raster image in GPlates?

A global raster image is loaded using the operation **Open Global Raster** in the GPlates **File Menu**. This will show a dialog requesting the user to choose the raster image file to be loaded. When a raster image is loaded, it will replace the current raster image (if any).

Whether or not a currently-loaded raster is displayed can be controlled using the operation **Enable Raster Display** in the GPlates **View Menu**.

3. Time-Dependent Global Raster Sets

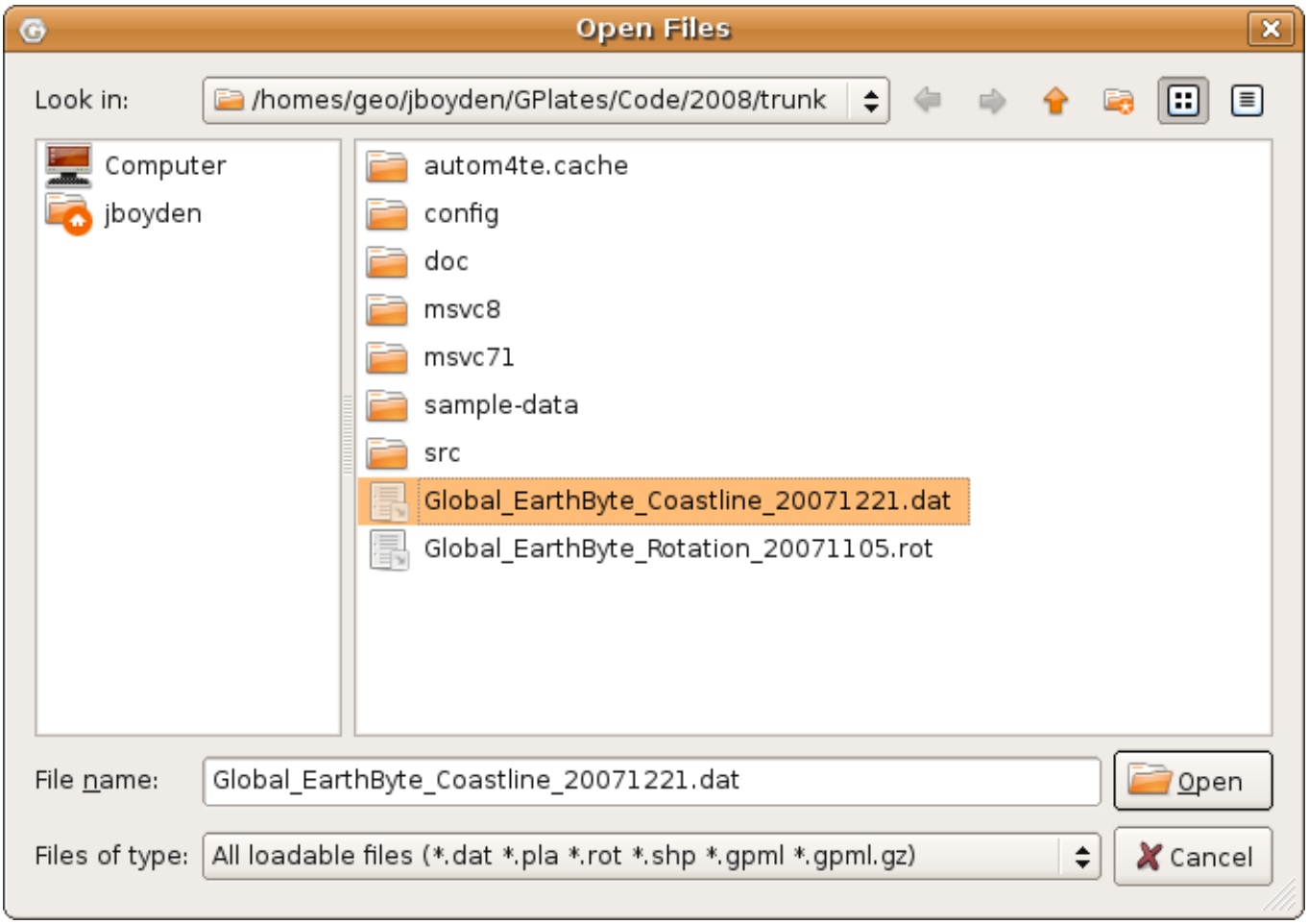
3.1. What is a time-dependent raster set?

GPlates has the facility to display time-dependent global raster images (that is, global raster images whose pixels change according to the reconstruction time).

In reality, what GPlates is displaying is a time-sequence of raster images — each image in the sequence corresponding to a particular instant in geological time. The user can instruct GPlates to load a sequence of raster image files contained within a single folder, and GPlates will display the appropriate image for the reconstruction time. As the user changes the reconstruction time, the raster image on the globe will update accordingly.

3.2. How do I load an existing time-dependent raster set?

A time-dependent raster set is loaded using the operation **Open Time Dependent Global Raster Set** in the GPlates **File Menu**. This will show a dialog requesting the user to choose the folder containing the time-dependent rasters.



A time-dependent raster set is treated the same as a regular raster image by GPlates, in the sense that when a new raster image or time-dependent raster set is loaded, it will replace the current raster image or time-dependent raster set (if any). Furthermore, whether or not a currently-loaded time-dependent raster set is displayed is also controlled by the operation **Enable Raster Display** in the GPlates **View Menu**.

Links to existing time-dependent raster sets may be found on the "Downloads" page of the GPlates website: http://www.gplates.org/downloads.html

3.3. How can I create my own time-dependent raster set?

As already described, a time-dependent raster set is actually a sequence of raster image files contained within a single folder. The name of the folder is unimportant, but the raster image files must adhere to three rules:

1. Each raster image file must be in a raster image format which GPlates is able to handle — currently only JPEG is supported.
2. Each raster image file must have a file-name of the form "*name-time*.jpg" or "*name-time*.jpeg", where *time* is an integer value representing a number of millions of years before the present day — this is the instant of geological time to which that raster image corresponds.
3. All raster image files in the folder must have the same *name* component, followed by a hyphen before the integer. (This *name* component can contain further hyphens and numbers if desired.)

For example, the files:

- topography-0.jpg

- topography-1.jpg
- topography-2.jpg

together form a time-dependent raster set. In the above example the image lasts from 0-2Ma and has "time steps" of 1Ma.

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Loading And Saving

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Before you load any data into GPlates the globe will appear as a blank sphere; in order to start with GPlates you will need to know how to load, save and unload data. This chapter describes how to load, save and unload data from GPlates.

You can still manipulate the view of the globe even though it is blank. See Chapter 5, Controlling the View for more details.

1. Introducing Feature Collections

When a data file is loaded in GPlates, it is loaded in the **Feature Collection**. All data in GPlates are represented as features (e.g. MOR, volcano, etc) — whether geological data or reconstruction data. Regardless of the file format, all features will be contained internally as GPlates features. However GPlates *will* remember the name and format of the file for saving.

All data loaded in GPlates are represented as *features*; all data-manipulation functions are operations upon features. GPlates offers a rich variety of feature types, enabling GPlates to handle geographic, paleo-geographic, geological and tectonic data. Basin, Coastline, Craton, Fault, Hotspot, Isochron, Mid-Ocean Ridge, Seamount, Subduction Zone, Suture and Volcano are just some of the many feature types handled by GPlates. The meta-data attributes of data are contained within named *properties* of the features.

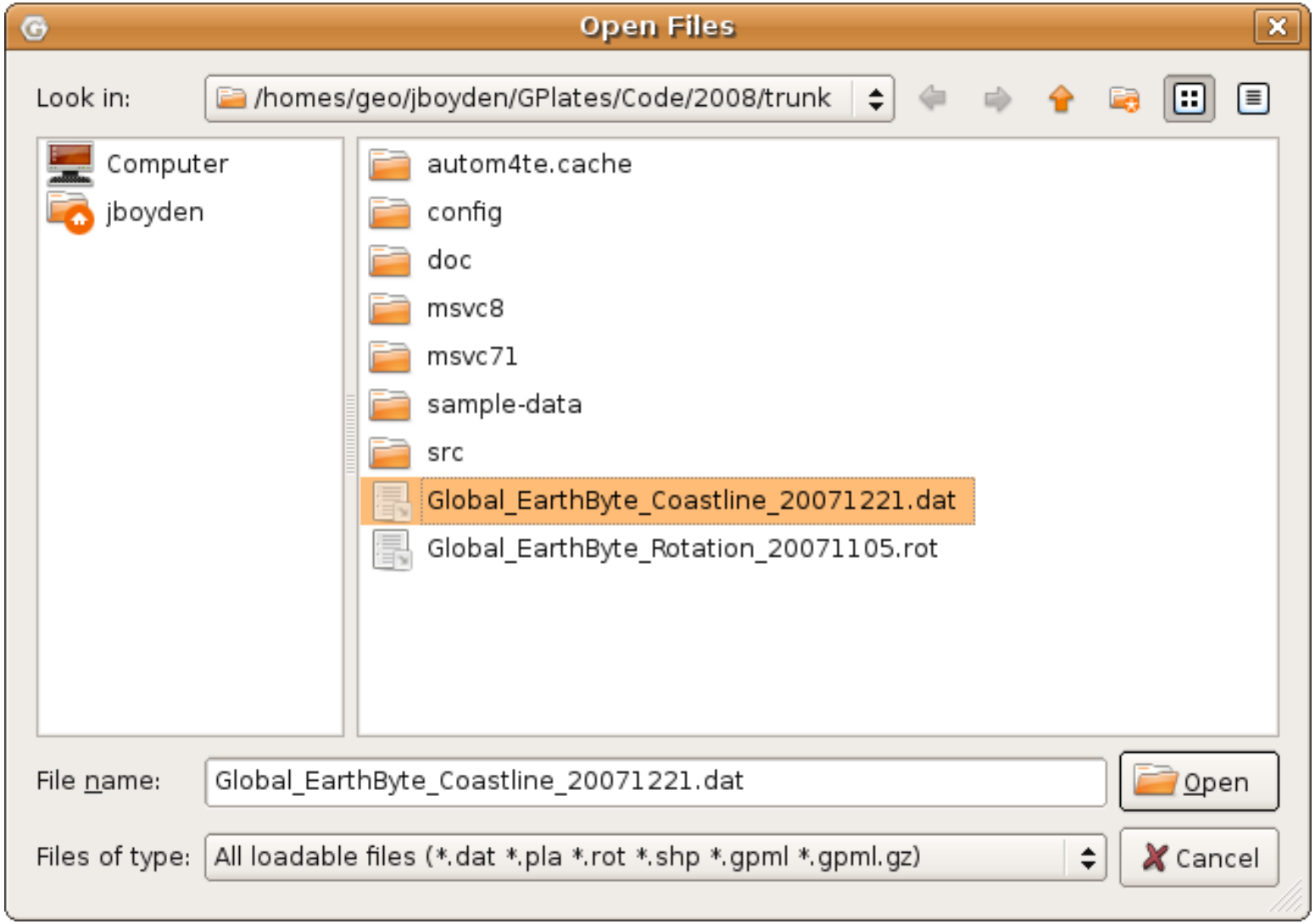
GPlates is able to load and save a number of data-file formats (e.g. PLATES4). When a data file is loaded in GPlates, the data will be converted to the appropriate types of features and placed into a **Feature Collection**. One **Feature Collection** in GPlates corresponds to one data file on the disk. Even though the data have been converted to GPlates features, GPlates will remember the name and original format of the file for saving.

When the features are saved, they will be converted back to their original data format. It is also possible to save features into different data formats using the "Save As" or "Save a Copy" buttons in the Manage Feature Collections dialog. To specify a different file format, change the file-name extension (e.g .dat .pla etc) to the extension for the desired format.

2. How to Load a File

To load files into GPlates:

1. Go to the **File Menu** in the menu bar.
2. Scroll down to **Open Feature Collection** (shortcut: Ctrl+O).
3. A classic File Open dialog window will appear; select the file to be loaded.



2.1. How do I load a raster image in GPlates?

A global raster image is loaded using the operation **Open Global Raster** in the GPlates **File Menu**. This will show a dialog requesting the user

to choose the raster image file to be loaded. When a raster image is loaded, it will replace the current raster image (if any).

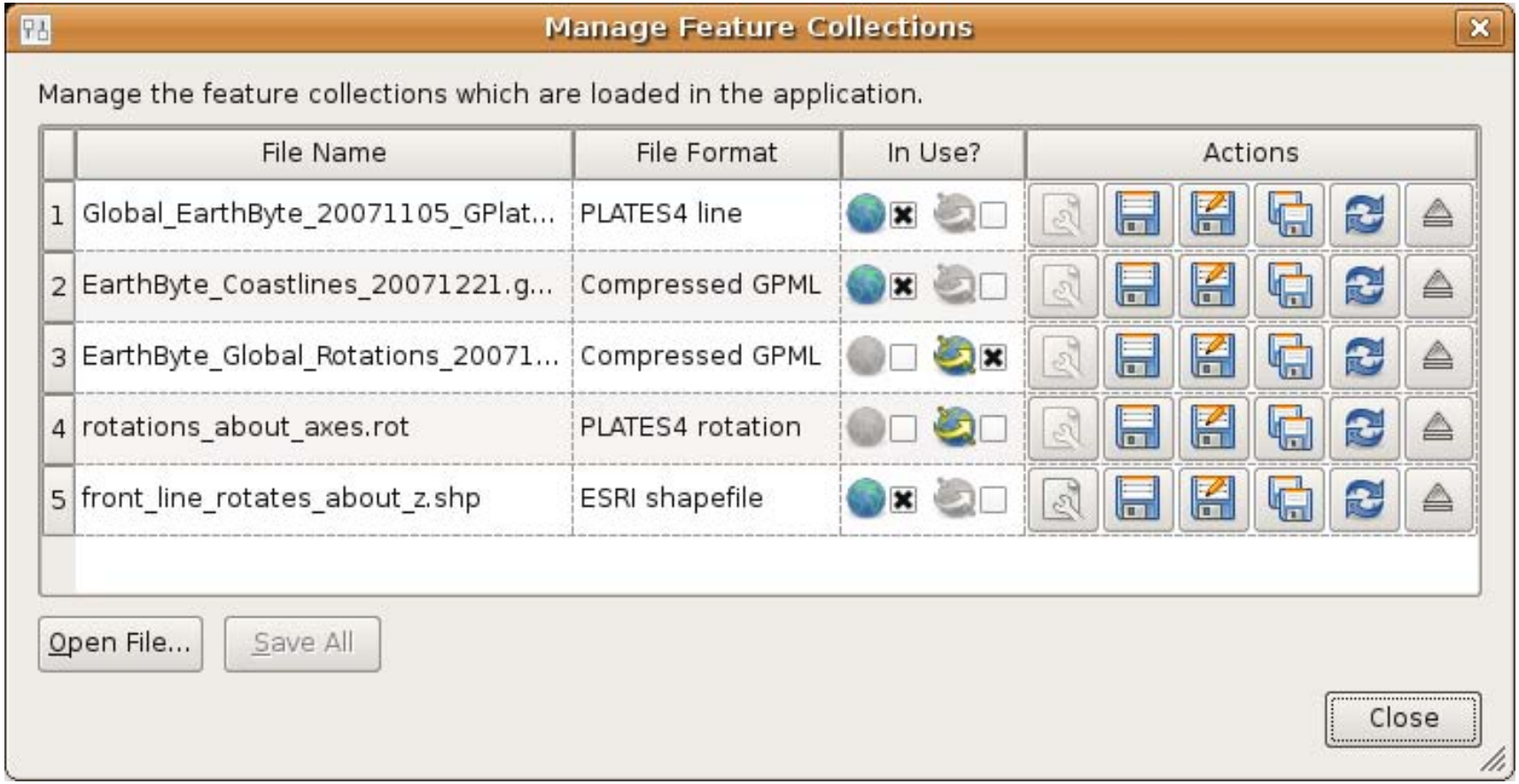
Whether or not a currently-loaded raster is displayed can be controlled using the operation **Enable Raster Display** in the GPlates **View Menu**.

3. The Manage Feature Collections Dialog

This dialog window enables you to load new files, and save, reconfigure and unload currently-loaded files. This is where you will find any file-specific operations.

How to show The Manage Feature Collections Dialog:

1. Go to the **File Menu** in the menu bar.
2. Click on **Manage Feature Collections** menu item.



A single row in the table corresponds to one file.

Column Name	Function
File Name	The name of the file on disk
File Format	The file format type
In Use?	Whether the file is in use on the globe canvas
Actions	A collection of operations relevant to this file

If you place your mouse over the file name a tool tip appears indicating the directory the file is located in.

4. File Errors

4.1. Introduction

File read errors may occur when attempting to load data from file (or some other data source, such as a database). GPlates developers have done their best to notify the user of the specifics of the error so corrections can be made.

4.2. Error Categories

It is anticipated that file input errors may fall into four categories:

1. Warning

2. Recoverable error
3. Terminating error
4. Failure to begin

4.2.1. Warning

- A warning is a notification of a problem (generally a problem in the data) which required GPlates to modify the data in order to rectify the situation.
- Examples of problems which might result in warnings include:
    - Data which are being imported into GPlates, which do not possess quite enough information for the needs of GPlates *(such as total reconstruction poles in PLATES4 rotation-format files which have been commented-out by changing their moving plate ID to 999)*.
    - An attribute field whose value is obviously incorrect, but which is easy for GPlates to repair *(for instance, when the Number Of Points field in a PLATES4 line-format polyline header does not match the actual number of points in the polyline)*.
- A warning will not have resulted in any data loss, but you may wish to investigate the problem, in order to verify that GPlates has *corrected* the errors in the data in the way you would expect; and to be aware of incorrect data which other programs may handle differently.

4.2.2. Recoverable error

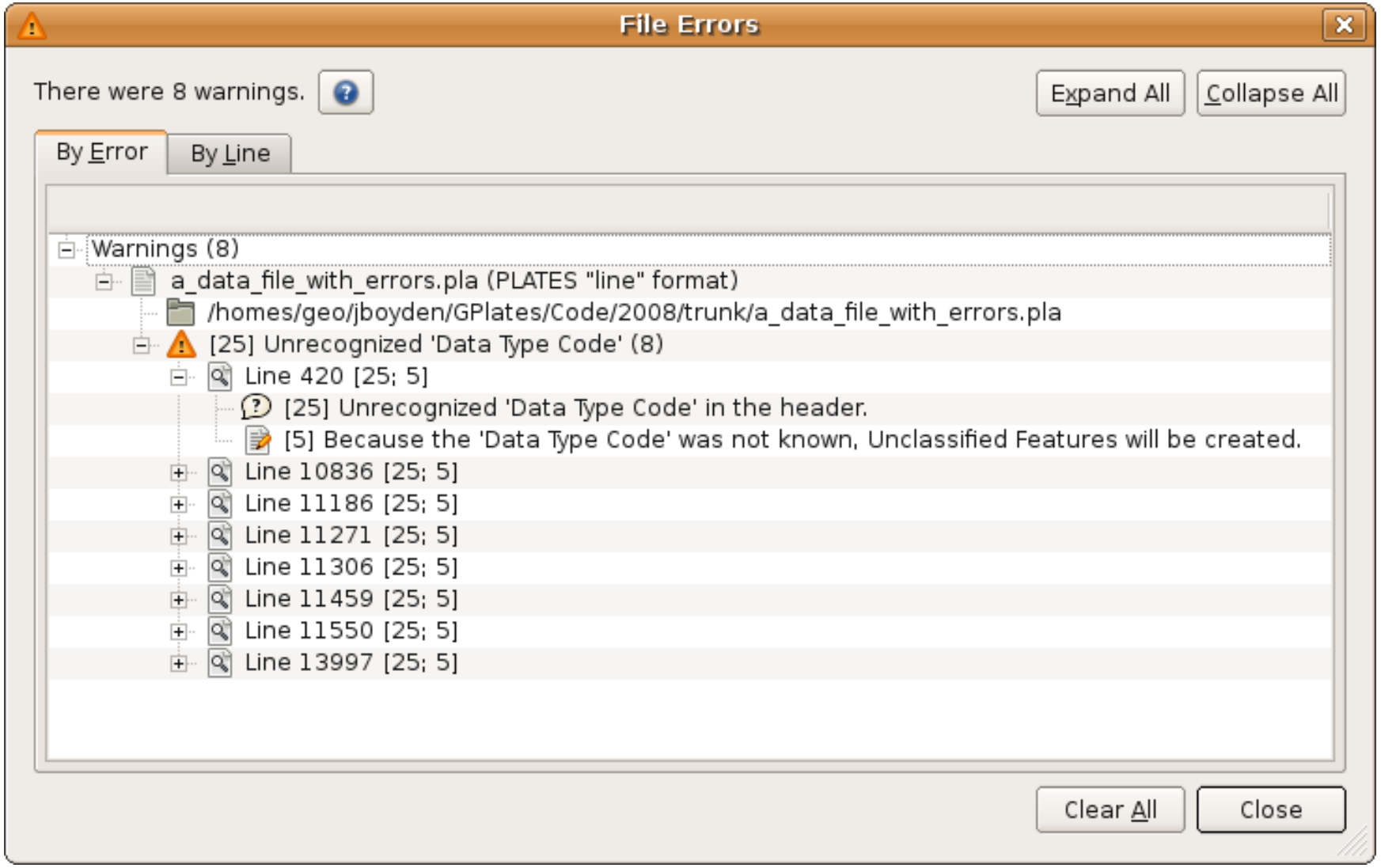
- A recoverable error is an error *(generally an error in the data)* from which GPlates is able to recover, although some amount of data had to be discarded because it was invalid or malformed in such a way that GPlates was unable to repair it.
- Examples of recoverable errors might include:
    - When the wrong type of data encountered in a fixed-width attribute field *(for instance, text encountered where an integer was expected)*.
- **When a recoverable error occurs, GPlates will do the following:**
    - Retain the data it has already successfully read.
    - Discard the invalid or malformed data *(which will result in some data loss)*.
    - Continue reading from the data source. GPlates will discard the smallest possible amount of data, and will inform you exactly what was discarded.

4.2.3. Terminating error

- A terminating error halts the reading of data in such a way that GPlates is unable to read any more data from the data source.
- Examples of terminating errors might include:
  - A file-system error.
  - A broken network connection.
- When a terminating error occurs, GPlates will retain the data it has already read, but will not be able to read any more data from the data source.

4.2.4. Failure to begin

- A failure to begin has occurred when GPlates is not even able to start reading data from the data source.
- Examples of failures to begin might include:
  - The file cannot be located on disk or opened for reading.
  - The database cannot be accessed; no network connection could be established.
- In the event of a failure to begin, GPlates will not be able to load any data from the data source.

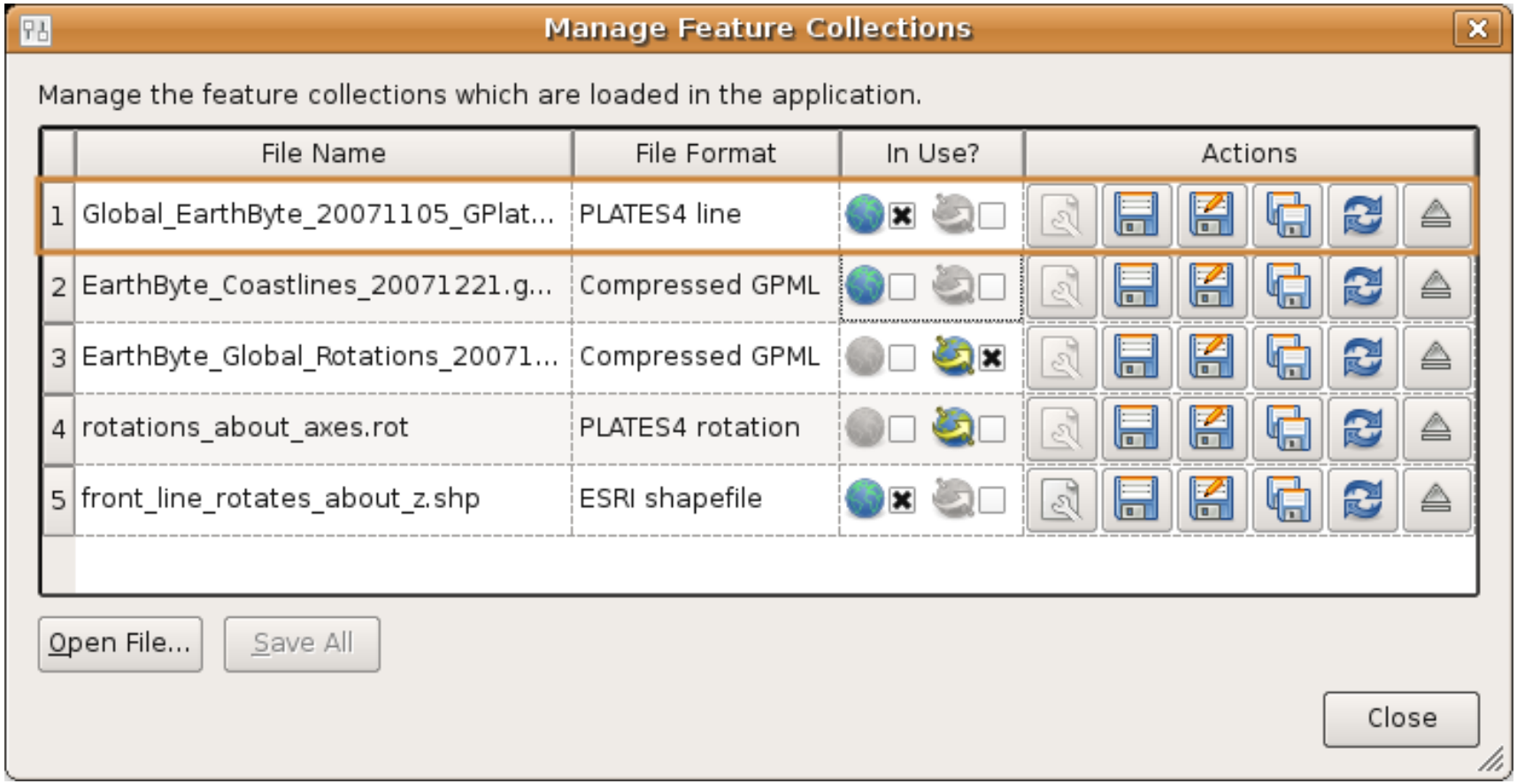


4.3. Saving

There are three different ways to save a file in GPlates.

The **Manage Feature Collections** dialog contains a table of controls and status information about the feature collections that are loaded in GPlates; each row corresponds to a single feature collection, and lists file name, format and available actions.

Item	Name	Function
	File Properties	Edit the file's configuration
	Save	Save the file using the current name
	Save As	Save the file using a new name
	Save a Copy	Save a copy of the file with a different name
	Refresh	Reload the file from disk
	Eject	Unload the file from GPlates



4.3.1. Save…

- saves the current file with its current name.
- will overwrite previous contents of the file.

This is useful when you have modified your file and are happy to save these changes.

Do not edit the file in two separate programs simultaneously (e.g. GPlates and a text-editor)

4.3.2. Save As…

- saves the current file with a new name.
- will leave the previous file intact.
- will load the new file in place of the old file.
- gives you the opportunity to change the file format.

This is useful when you want to edit a copy of a file without changing the original.

4.3.3. Save a Copy…

- saves a copy of the current file with a new name.
- will leave the previous file intact.
- will not replace the unload the current file.
- gives you the opportunity to change the file format.

This is useful for making backups of your work as you go.

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Controlling The View

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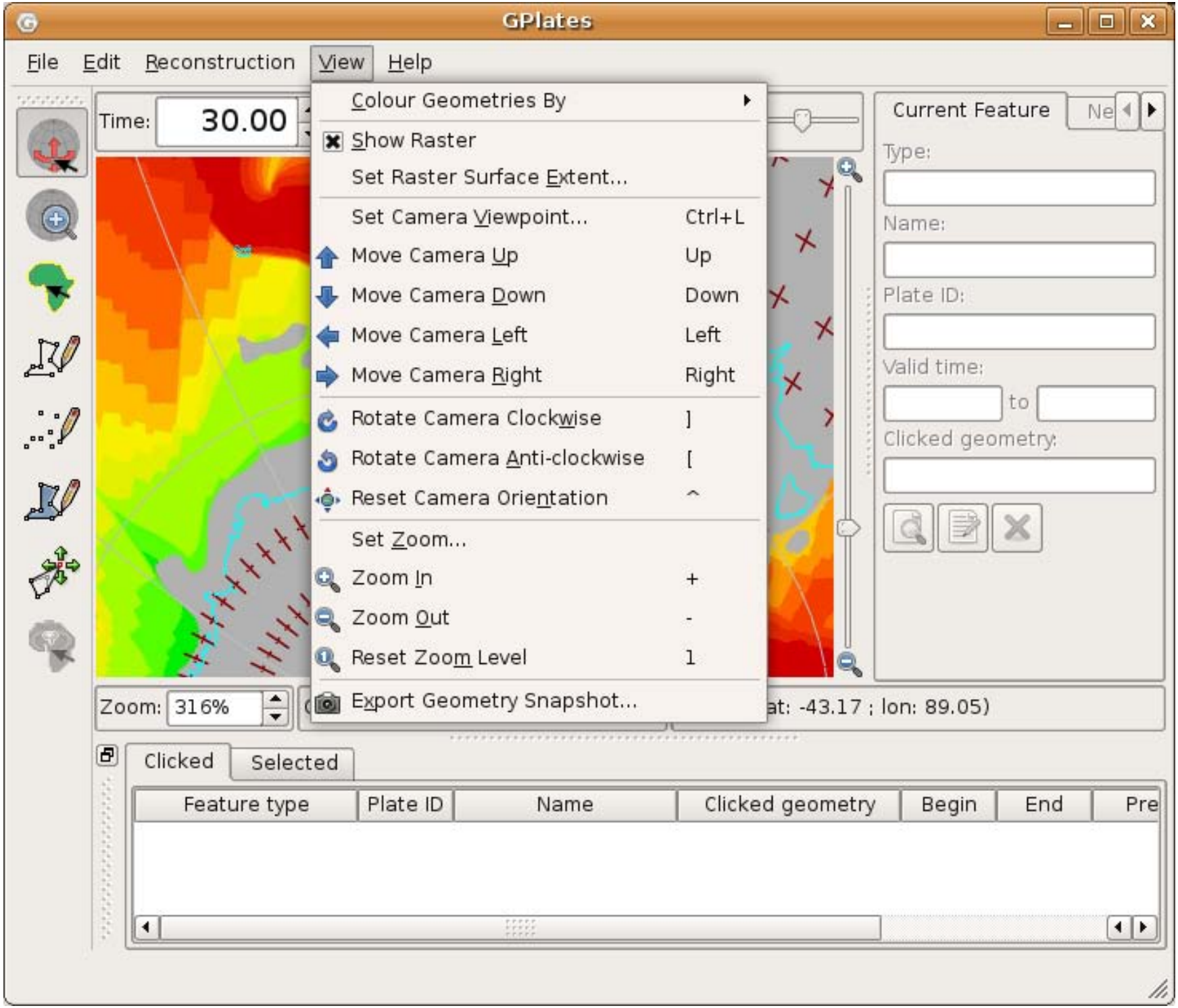
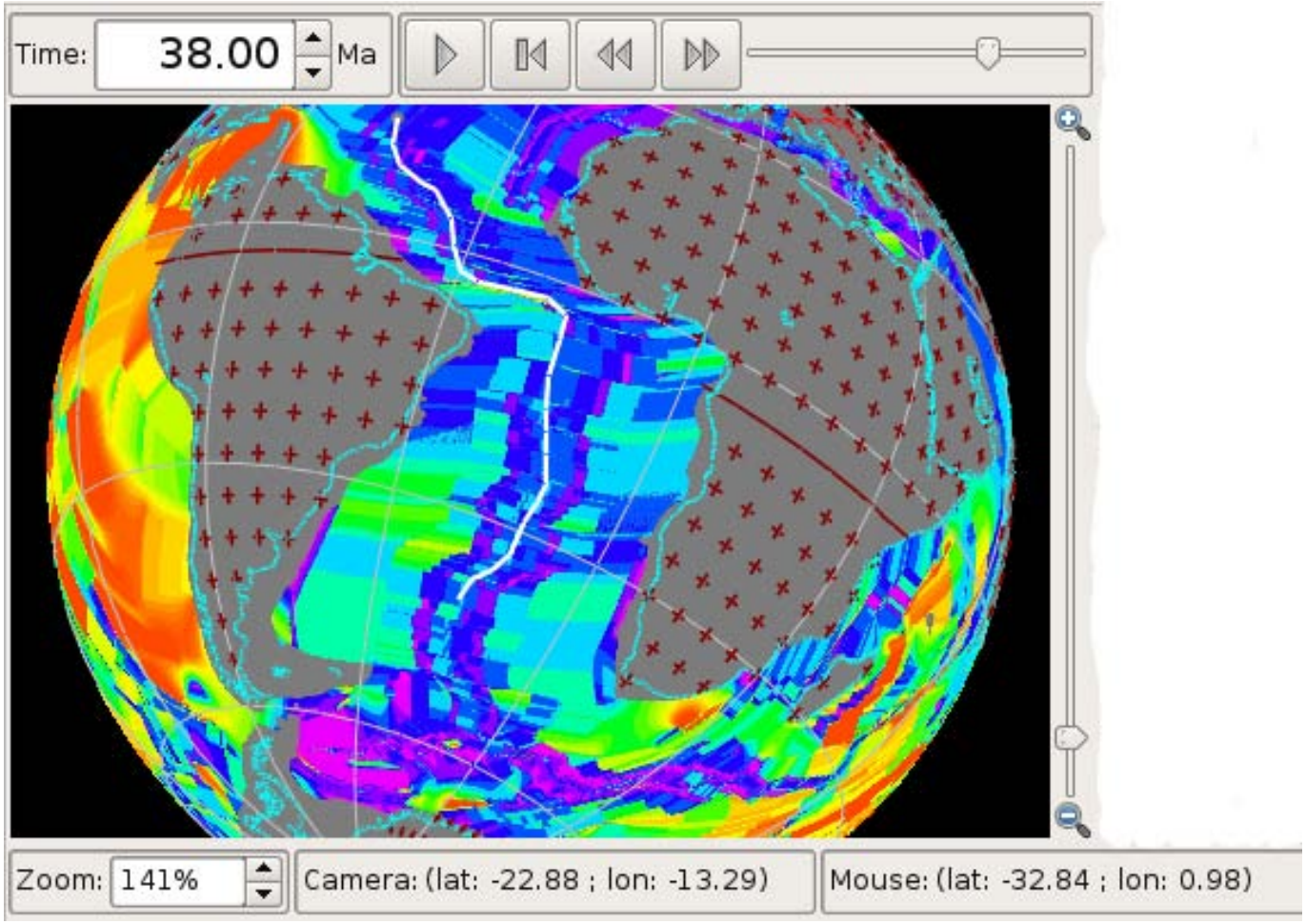
This Chapter provides a comprehensive overview of how to manipulate their view of the globe, data and features.

1. View Menu

The **View Menu** enables the user to manipulate the globe, and includes the following options:


GPlates
File
Edit
Reconstruction
View
Help
Time:
30.00
Colour Geometries By
Show Raster
Set Raster Surface Extent...
Set Camera Viewpoint... Ctrl+L
Move Camera Up Up
Move Camera Down Down
Move Camera Left Left
Move Camera Right Right
Rotate Camera Clockwise]
Rotate Camera Anti-clockwise [
Reset Camera Orientation ^
Set Zoom...
Zoom In +
Zoom Out -
Reset Zoom Level 1
Export Geometry Snapshot...
Current Feature
Type:
Name:
Plate ID:
Valid time:
to
Clicked geometry:
Zoom: 316%
at: -43.17 ; lon: 89.05)
Clicked
Selected
Feature type
Plate ID
Name
Clicked geometry
Begin
End
Pre

2. Reconstruction View



Name	Description
Time Controls	A collection of user-interface controls for precise control of the reconstruction time.
Zoom Controls	A collection of user-interface controls for precise control of the Globe View camera zoom.
Zoom Slider	A mouse-controlled slider which controls the zoom level of the Globe View camera.
Camera Coordinate	An information field which indicates the current globe position of the Globe View camera

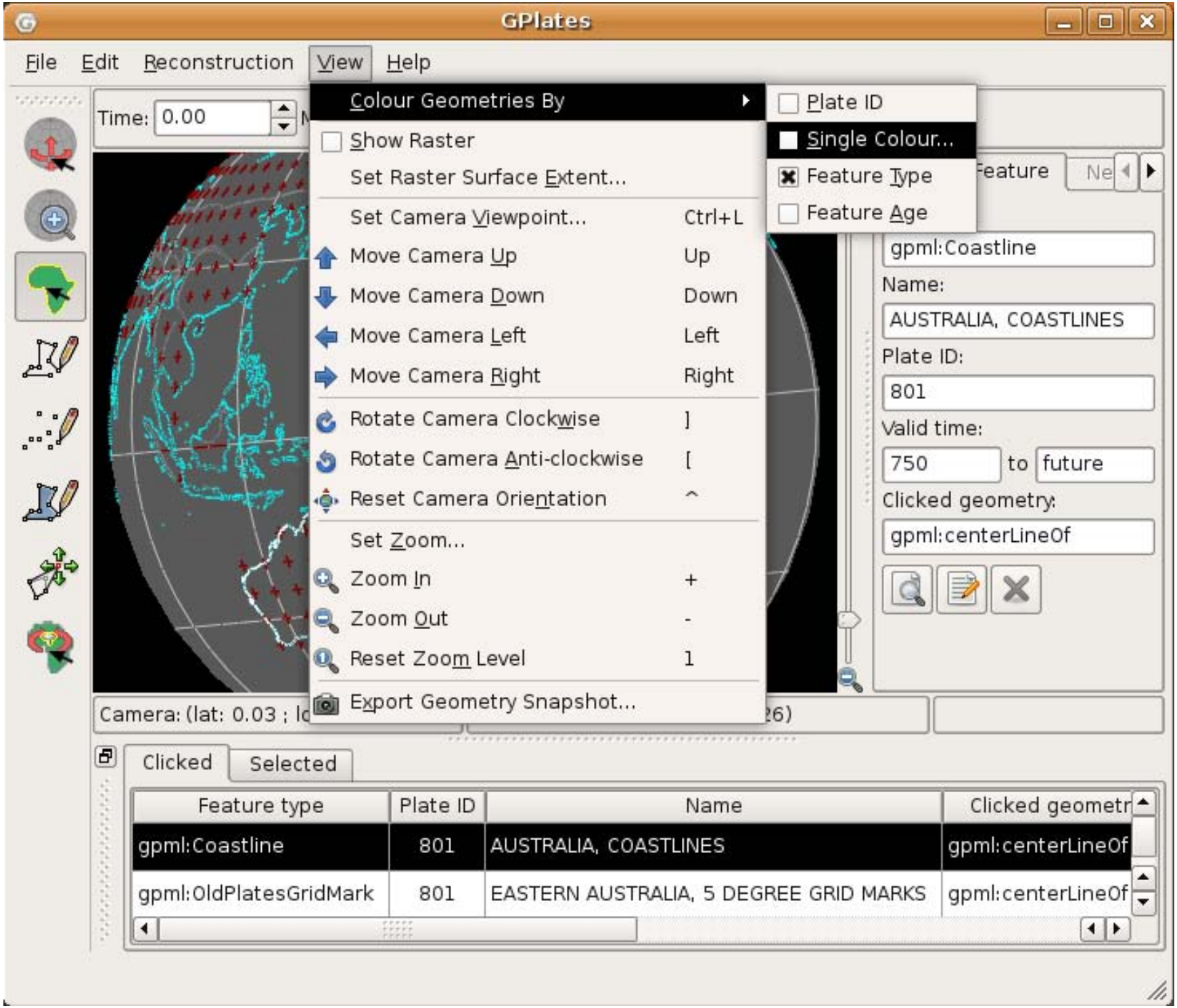
3. Tool Palette

The first two tools in the **Tool Palette** control your view of the GPlates globe or map. The **Tool Palette** includes camera positioning tools, feature selection tools and drawing tools. A tool is activated by clicking on it; only one tool can be active at any time. The **Current Feature Panel** will change to reflect the current tool that is activated.

Item	Tool	Operation
	Drag Globe	Click and drag to re-orient the globe. Shift+drag to rotate the globe
	Zoom In	Click to zoom in. Shift+click to zoom out. Ctrl+drag to drag the globe

4. Colouring Features

Found under the **View Menu**, in the **Colour Geometries By** sub-menu, this operation allows the user to choose how feature geometries are coloured. Current colouring methods include: by plate ID; by age; by feature type; or by a single user-specified colour.


GPlates
File
Edit
Reconstruction
View
Help
Time: 0.00
Colour Geometries By
Show Raster
Set Raster Surface Extent...
Set Camera Viewpoint... Ctrl+L
Move Camera Up Up
Move Camera Down Down
Move Camera Left Left
Move Camera Right Right
Rotate Camera Clockwise]
Rotate Camera Anti-clockwise [
Reset Camera Orientation ^
Set Zoom...
Zoom In +
Zoom Out -
Reset Zoom Level 1
Export Geometry Snapshot...
Plate ID
Single Colour...
Feature Type
Feature Age
gpml:Coastline
Name:
AUSTRALIA, COASTLINES
Plate ID:
801
Valid time:
750 to future
Clicked geometry:
gpml:centerLineOf
Camera: (lat: 0.03 ; lo
Clicked
Selected
Feature type
Plate ID
Name
Clicked geometr
gpml:Coastline
801
AUSTRALIA, COASTLINES
gpml:centerLineOf
gpml:OldPlatesGridMark
801
EASTERN AUSTRALIA, 5 DEGREE GRID MARKS
gpml:centerLineOf

Last updated 09-Mar-2009 18:53:19
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Reconstructions

Table of Contents

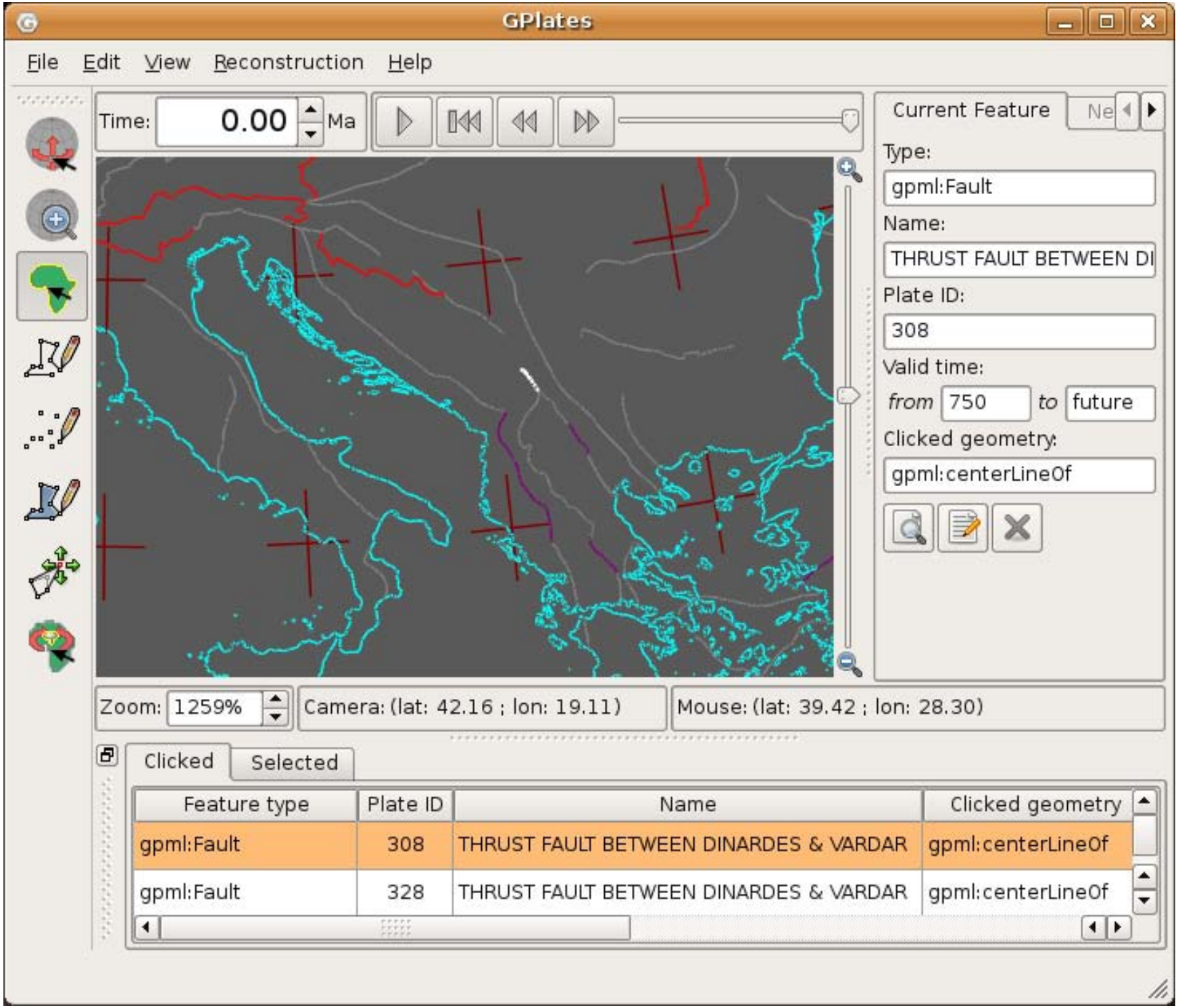
1. Introduction

The motions of tectonic plates through geological time may be described and simulated using plate-tectonic reconstructions. Plate-tectonic reconstructions are the calculations of the probable positions, orientations and motions of tectonic plates through time, based upon the relative (plate-to-plate) positions of plates at various times in the past which may be inferred from other data. Geological, geophysical and paleo-geographic data may be attached to the simulated plates, enabling a researcher to trace the motions and interactions of these data through time.

Geological time instants in GPlates are measured in units of Mega-annum (Ma), in which 1 Ma is equal to one million years in the past. For example, the allowable range for reconstructions is from 0 to 10 000 Ma (i.e. present day to 10^{10} years ago).

The current age of the earth 4.5×10^9 years!

2. Main Window Interface Components


GPlates
File Edit View Reconstruction Help
Time: 0.00 Ma
Current Feature
Type:
gpml:Fault
Name:
THRUST FAULT BETWEEN DI
Plate ID:
308
Valid time:
from 750 to future
Clicked geometry:
gpml:centerLineOf
Zoom: 1259%
Camera: (lat: 42.16 ; lon: 19.11)
Mouse: (lat: 39.42 ; lon: 28.30)
Clicked
Selected
Feature type
Plate ID
Name
Clicked geometry
gpml:Fault
308
THRUST FAULT BETWEEN DINARDES & VARDAR
gpml:centerLineOf
gpml:Fault
328
THRUST FAULT BETWEEN DINARDES & VARDAR
gpml:centerLineOf

2.1. Slider

Interface to interact with reconstruction animations in GPlates, discussed in further detail below.

2.1.1. Play

Starts animation, when pressed it changes to the pause button

2.1.2. Pause

Halts animation, when pressed it changes to play button

2.1.3. Reset

Returns animation to the start time

2.1.4. Fast Forward

Step forwards one frame in the animation

2.1.5. Rewind

Step backwards one frame in the animation

2.2. Step Forwards One Frame / Step Backwards One Frame (Fast Forward and Rewind):

These buttons are used to change the current reconstruction time that you are viewing in small steps. Pressing the buttons once, or using their shortcut keys (Ctrl+I goes forwards; Ctrl+Shift+I goes backwards) will adjust the reconstruction time by one frame. The time interval between frames can be adjusted in the **Animate Dialog** or the **Specify Time Increment** menu operation. Both of these can be accessed via the **Reconstruction menu**.

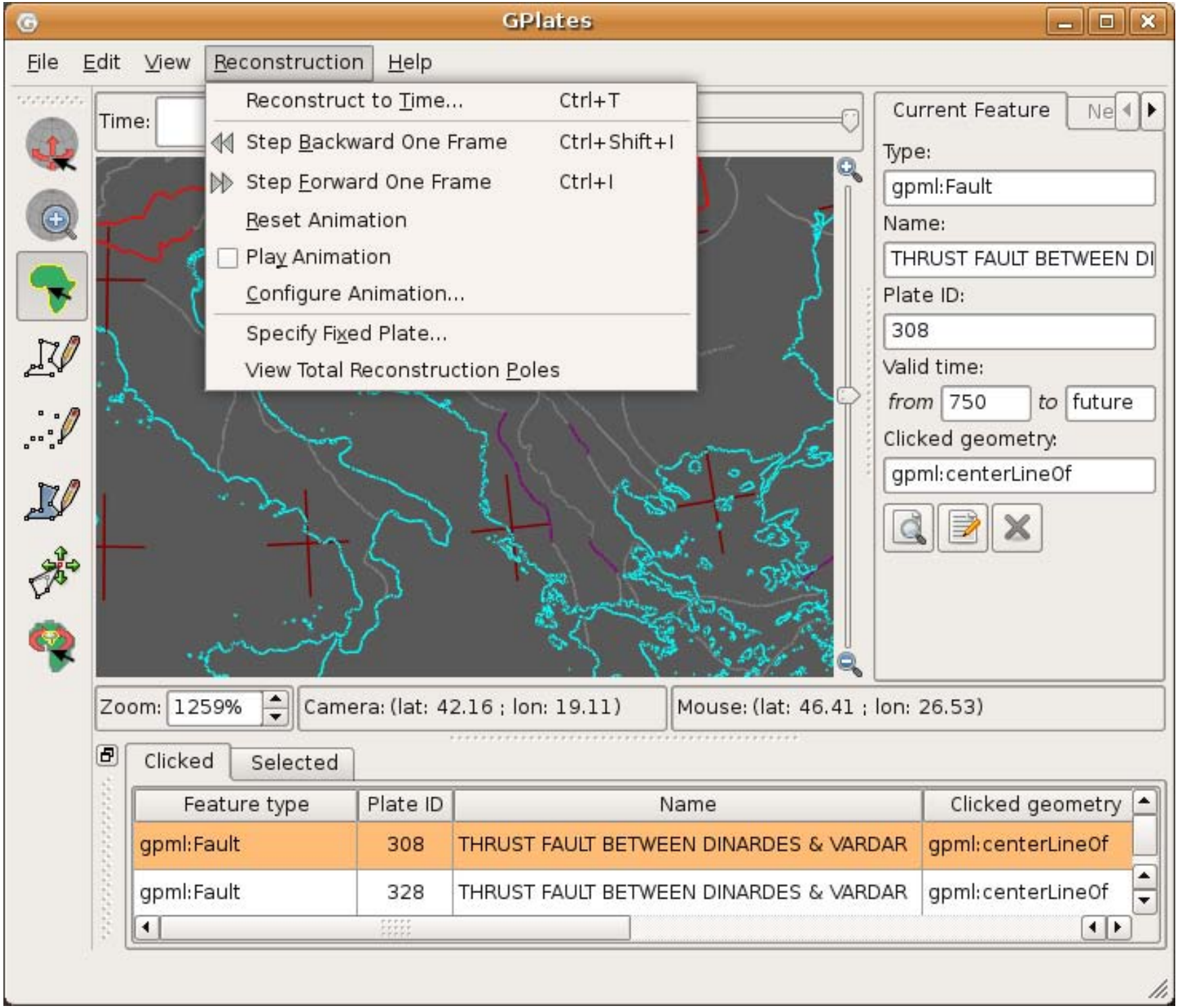
- The Step Forwards one Frame / Step Backwards one Frame buttons can be held down to move through time rapidly.

The forwards and backwards buttons apply relative to the current animation. Normally, the present day (0 Ma) is at the right-hand side of the animation slider, and the distant past is on the left-hand side. Using the forwards and backwards buttons move the slider in the way you would expect.

One important thing to note is that GPlates makes it possible for you to set a reverse animation, where the start time is the present day (or near past), and the end time is in the distant future. When an animation is set up this way, the slider and buttons behave as consistently as possible; your start time (the present) is on the left, and your end time (the distant past) is on the right. Using the **Step Forwards one Frame** button moves the slider to the right (into the past), and the **Step Backwards one Frame** button does the opposite, as you would expect.

- The default settings for the **Slider** are: a time range of 140Ma to present and a time increment per frame of 1 million years

3. Reconstruction Menu


GPlates
File
Edit
View
Reconstruction
Help
Reconstruct to Time... Ctrl+T
Step Backward One Frame Ctrl+Shift+I
Step Forward One Frame Ctrl+I
Reset Animation
Play Animation
Configure Animation...
Specify Fixed Plate...
View Total Reconstruction Poles
Time:
Current Feature
Type:
gpml:Fault
Name:
THRUST FAULT BETWEEN DI
Plate ID:
308
Valid time:
from 750 to future
Clicked geometry:
gpml:centerLineOf
Zoom: 1259%
Camera: (lat: 42.16 ; lon: 19.11)
Mouse: (lat: 46.41 ; lon: 26.53)
Clicked
Selected
Feature type
Plate ID
Name
Clicked geometry
gpml:Fault
308
THRUST FAULT BETWEEN DINARDES & VARDAR
gpml:centerLineOf
gpml:Fault
328
THRUST FAULT BETWEEN DINARDES & VARDAR
gpml:centerLineOf

The **Reconstruction Menu** provides access to the following tools:

Menu Item	Shortcut	Operation
Reconstruct to Time	Ctrl+T	Show a reconstruction for the user-specified time
Step Forward One Frame	Ctrl+I	Step forward one frame in the animation
Step Backward One Frame	Ctrl+Shift +I	Step backward one frame in the animation
Animate		Pop up the Animate dialog to control the animation
Specify Fixed Plate		Specify the fixed plate in the plate hierarchy
View Total Reconstruction Poles		Pop up the Total Reconstruction Poles dialog

3.1. Reconstruct to Time

When this menu item is invoked, it will activate the Time field in the Main Window, which is used to specify the current reconstruction time. The user can type a new reconstruction time, or increase or decrease the value using the Up and Down arrow keys or the mouse scroll-wheel, before pressing the Enter key to execute the reconstruction.

The current frame of the animation always corresponds to the reconstruction time. Changing the reconstruction time will simultaneously change the current frame of the animation. If the specified time is outside the current range of the animation, the range will be extended.

3.2. Step Forward One Frame

This button is used to change the current reconstruction time forward that you are viewing in small steps.

3.3. Step Backward One Frame

This button is used to change the current reconstruction time backward that you are viewing in small steps.

3.4. Specify Fixed Plate

This item is used to choose the fixed plate of the plate hierarchy. It will be described in the chapter, **More On Reconstructions**.

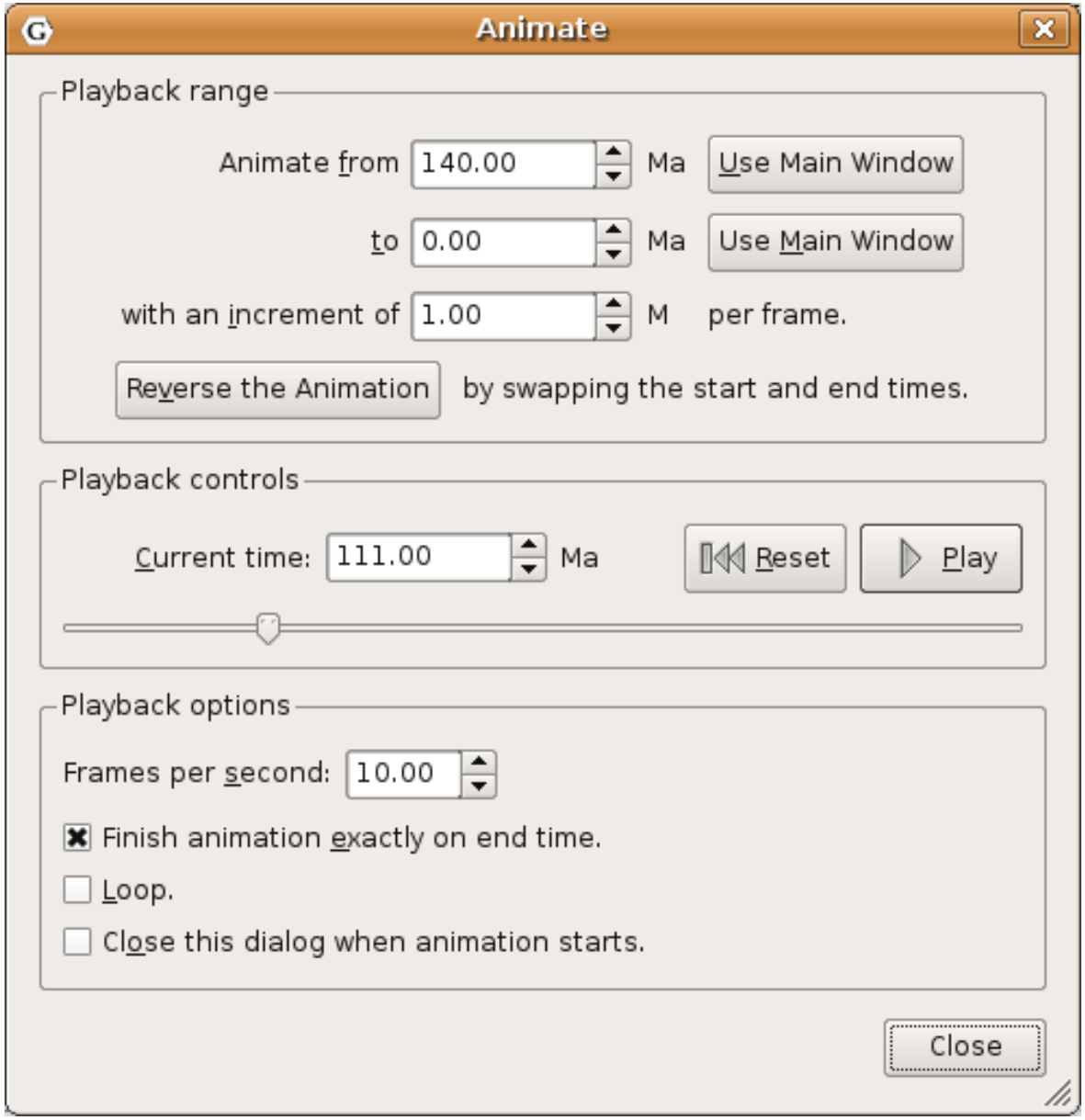
3.5. View Total Reconstruction Poles

When this item is activated, the **Total Reconstruction Poles** dialog will appear, enabling the user to view a variety of information about the reconstruction poles and the plate hierarchy at the current reconstruction time. This dialog will be described in the chapter, **More On Reconstructions**.

4. Animations

The animation operation, found in the Reconstruction menu, allows you to automate a reconstruction backwards or forwards through time. The user can set the start and end times by either entering the age or using the current time displayed in the main window. Frames per second can be set and there is also the option to loop the animation.

4.1. Animation Dialog



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Interacting With Features

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This chapter of the user manual provides a guide to interacting with the features that you are creating in GPlates.

1. Tools for Interacting with Features

To interact with features, the following tools can be used:

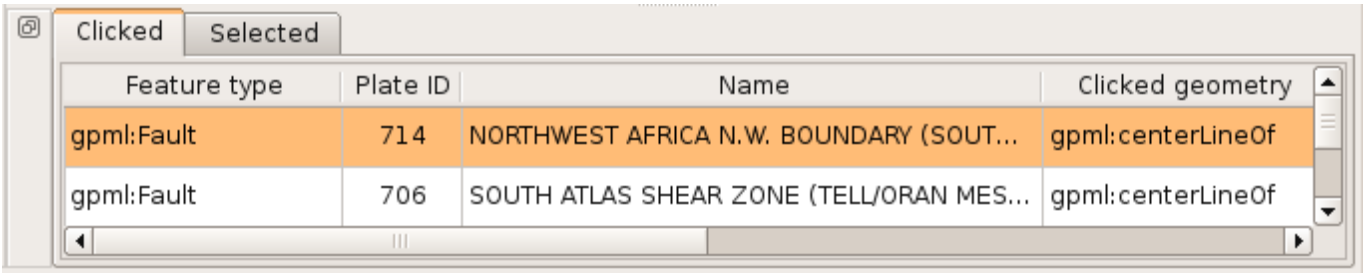
Item	Tool	Shortcuts	Operation
	Choose Feature	F	Click a geometry to choose a feature (being sure to be precise). Shift+click to query immediately. Ctrl+drag to re-orient the globe
	Move Vertex	V	Drag the vertices of the currently-chosen feature. Note: This tool can only be activated when a feature has been chosen.

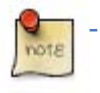
- To review information on all Tools please consult the **Introducing the Main Window Chapter**.

2. Choose Feature Tool

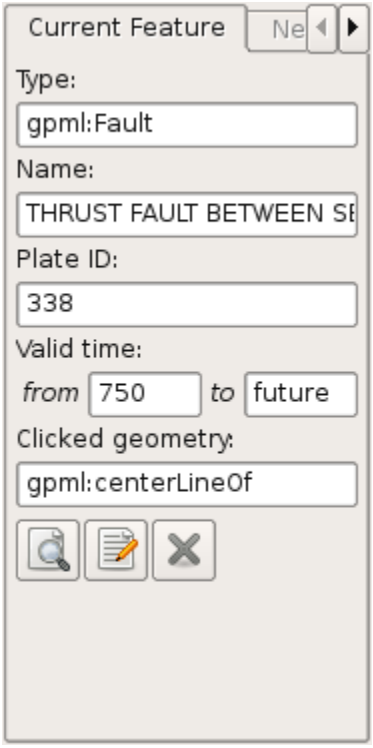
2.1. Clicked Geometry Table

You can query a feature, by first selecting then click the mouse cursor on what you want to query. The information will be displayed in the **Clicked Geometry Table**.



 - The table will list all features that have geometry in proximity to the point that was clicked.

2.2. Current Feature Panel



The Current Feature Panel summarises the pertinent properties of the current feature. This is the starting point for further interaction with the feature. It contains:

- Type of feature
- Name of the feature
- Plate ID of the feature (used for reconstruction)
- Conjugate plate ID of the feature, if it has one
- Plate IDs for the left and right sides of the feature, if applicable
- Life-time of the feature (the period for when it exists)
- The purpose of the clicked geometry
- Buttons to:
  - Query
  - Edit
  - Unselect feature

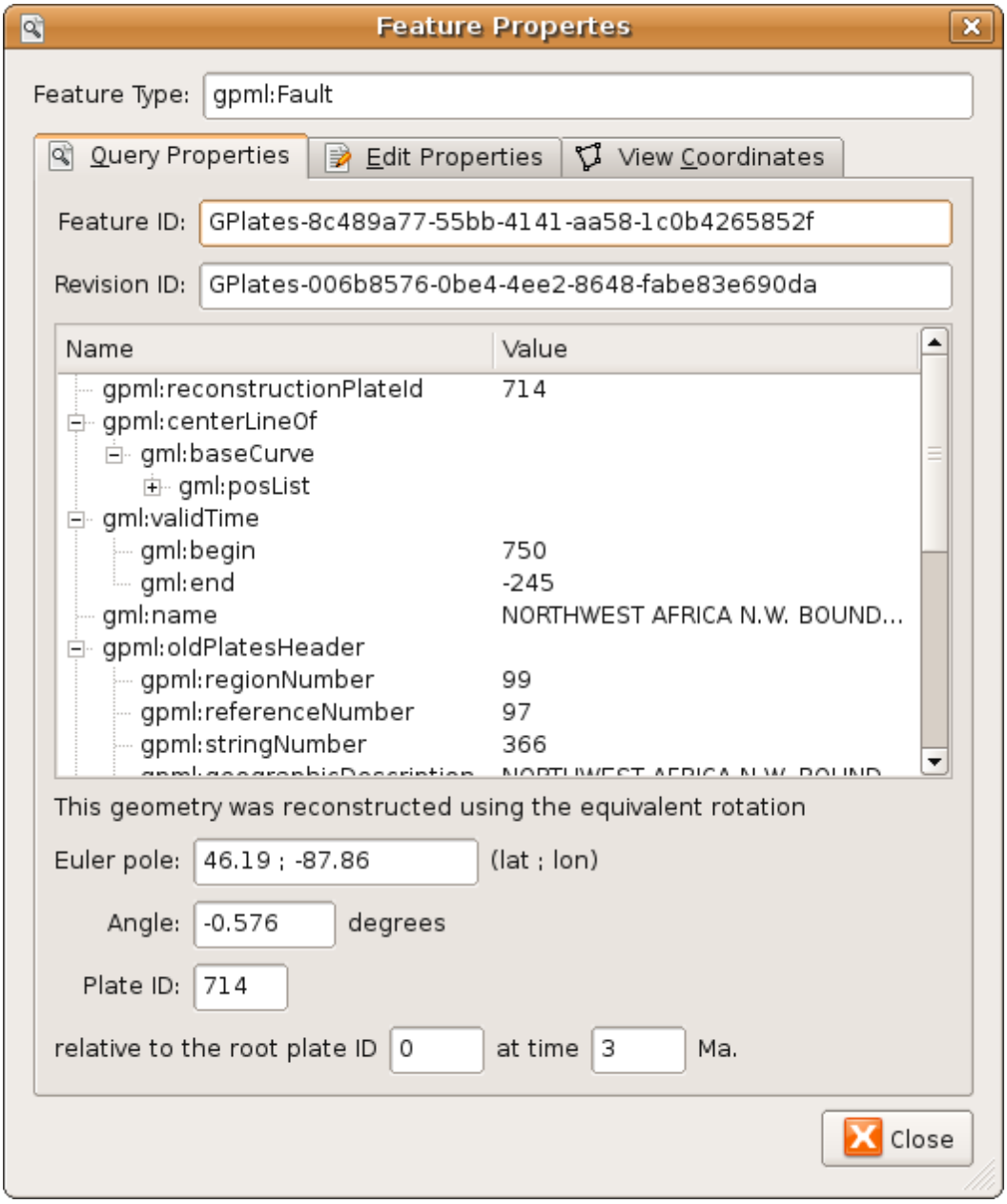
The **Edit** menu also provides access to:

- Query Feature (Ctrl+Y)
- Edit Feature (Ctrl+E)
- Undo (Ctrl+Z)
- Redo (Ctrl+R)
- Clear Selection

The valid life-time of the feature is a range of geological time, i.e from 65Ma to 0Ma (present day).

2.3. Querying Feature Properties

To query the properties of the current feature, either click , , at the bottom of the **Current Feature Panel**, or press Ctrl+Y to invoke the corresponding operation in the **Edit Menu**. **The Feature Properties** dialog will appear, containing a complete listing of the properties of the current feature.



2.3.1. Feature Type

This is the type of feature (e.g. fault, mid ocean ridge, subduction zone).

2.3.2. Query Properties Tab

This tab contains a complete listing of the properties of the current feature, presented in a concise, structured form which is easy to read, but does not allow editing of values.

2.3.3. Edit Properties Tab

This tab contains a table of properties, which enable editing of values. For more information on this tab, consult **Editing Feature Properties** below.

2.3.4. View Coordinates Tab

This tab contains a listing of the coordinates of the feature geometries, in both present-day and reconstructed-time position. For more information on this tab consult **Viewing Coordinates** below.

2.3.5. Feature ID

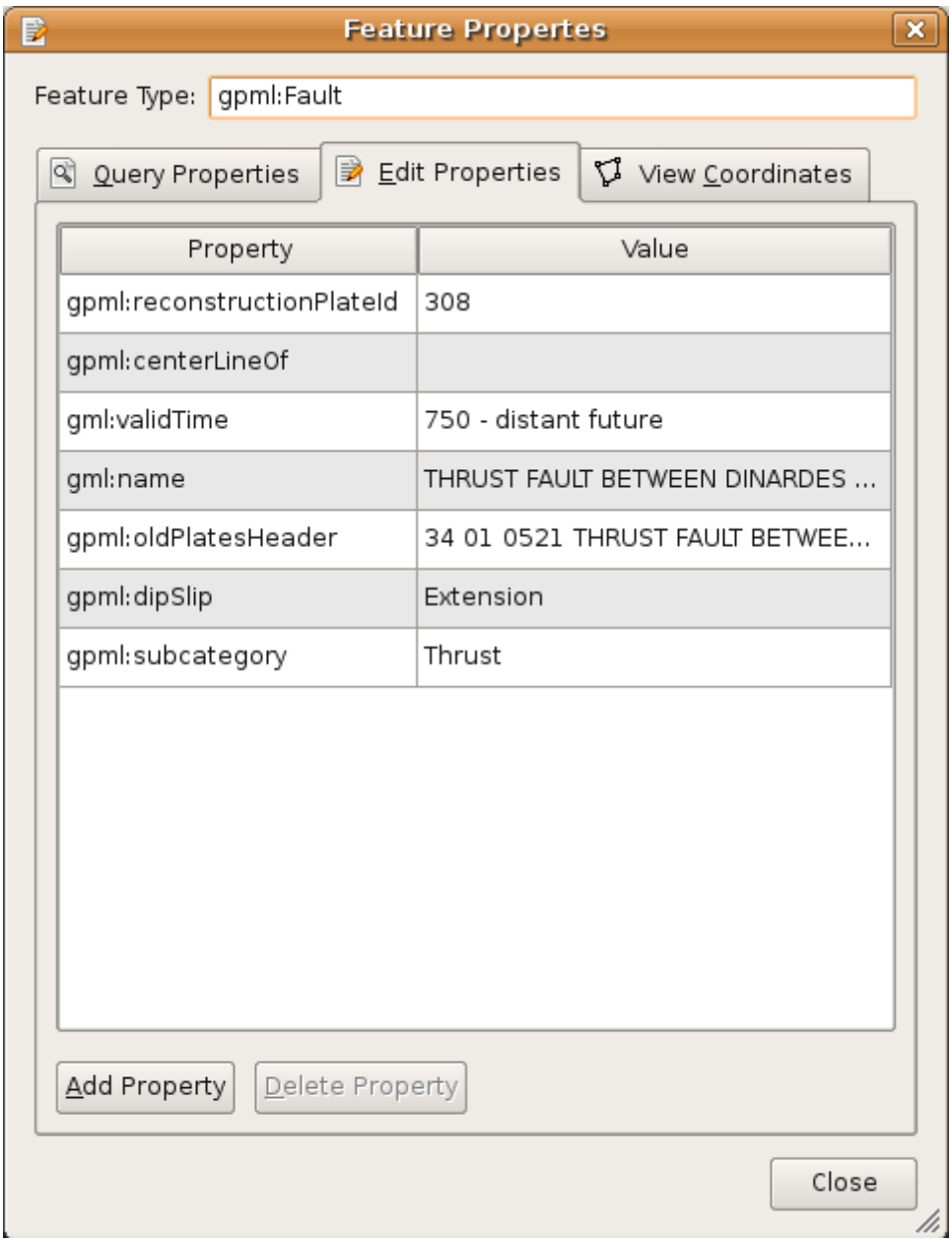
This is a unique label for this particular feature. It is a sequence of letters and numbers which is meaningful to GPlates. It is not yet of interest to users.

2.3.6. Revision ID

This is a unique label for this particular version of this feature. It is a sequence of letters and numbers which is meaningful to GPlates. It is not yet of interest to users.

2.4. Editing Feature Properties

This sequence of screenshots, first shows the initial window that will appear, and the following images display the options provided after selecting a property to edit. Each type of property has its own editing options.



The table in the centre lists all the properties belonging to the currently-chosen feature. The left hand column lists property names, and the right hand column lists property values.

The name of a property is a way to associate meaning with the feature data - for instance, this feature has a plate ID associated with it. That plate id is 308. It is stored in the gpml:reconstructionPlateId property, indicating that GPlates should use that plate ID to reconstruct the feature.

Clicking a row of the table will expand the bottom half of the dialog with new controls specific to the property that was clicked.

2.5. Editing Geometry

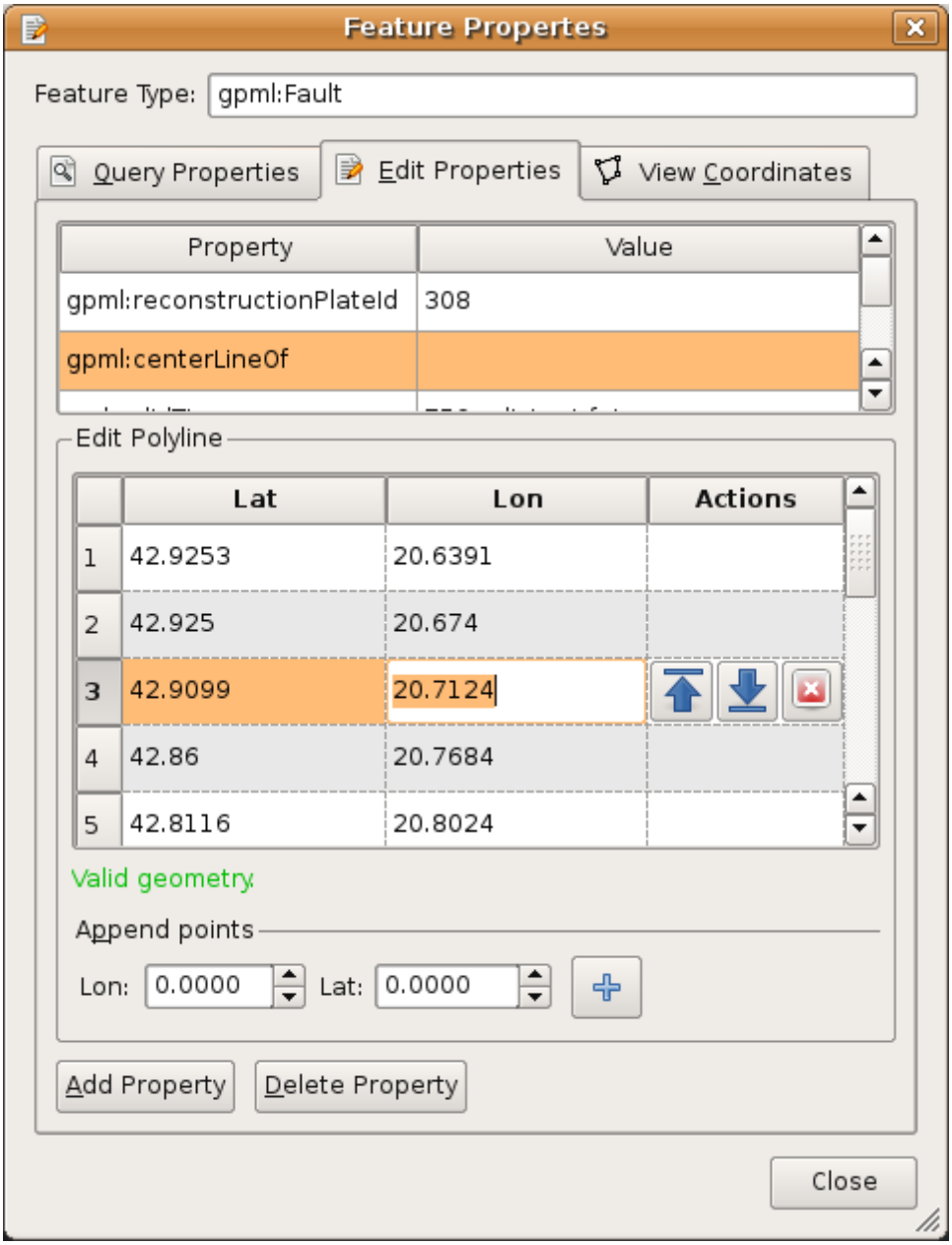
The controls for directly editing the coordinates used by geometry appears as a table with **Lat**, **Lon**, and **Actions** columns. Click a row of the table to select it, and the following action buttons will appear:

Insert a new row above

Insert a new row below

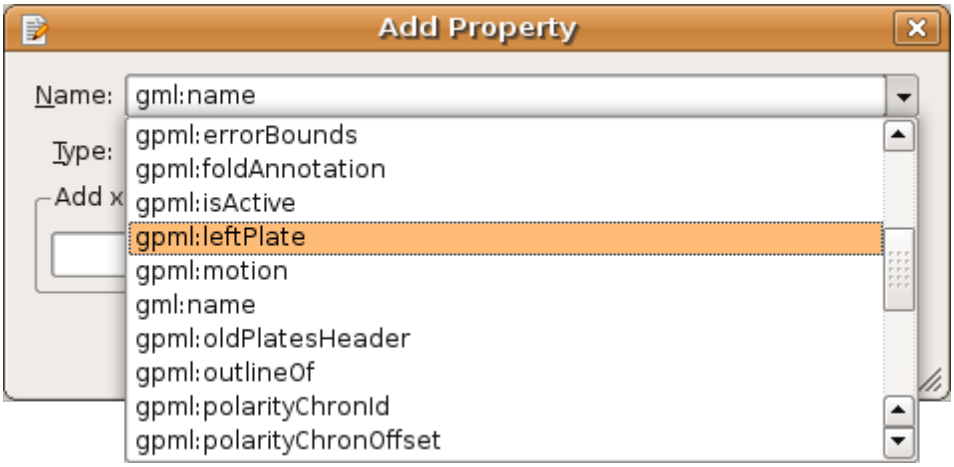
Delete row

- Double-clicking an entry in the table lets you edit a coordinate directly.
  - The **Valid Geometry** line will indicate if the coordinates in the table can be turned into correct geometry. It will indicate an error if there is something invalid about the coordinates, such as a lat/lon of 500 or similar.
- The "Append Points" spin-boxes are designed to be a convenient means of data entry, if you need to enter some points from a hard copy source.
  - Click in the **Lon** to start entering new coordinates. Type in a lon value, press **TAB**, type in a **lat** value, press **TAB** (to move to the "+" button), press **SPACE** to activate that button. The new coordinate line will be added to the table, and GPlates will prepare to receive the next line of input.
- Selecting a property from the table and selecting **Delete** will delete the property from the feature.

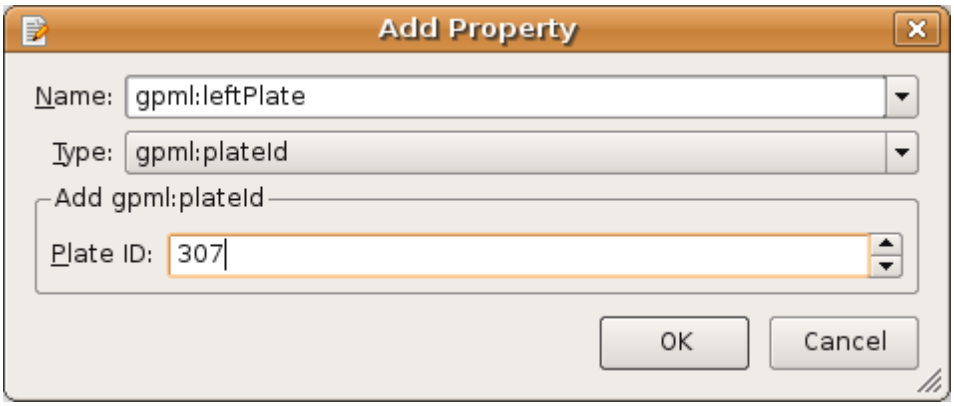


2.6. Adding a Feature Property

By clicking on **Add Property** in the **Feature Properties** window, a new dialog will appear where you can select the **Name**, **Type** and **Value** of a property. In most cases, you will only need to select the name of the property you wish to add; the type of that property will be filled in automatically for you.

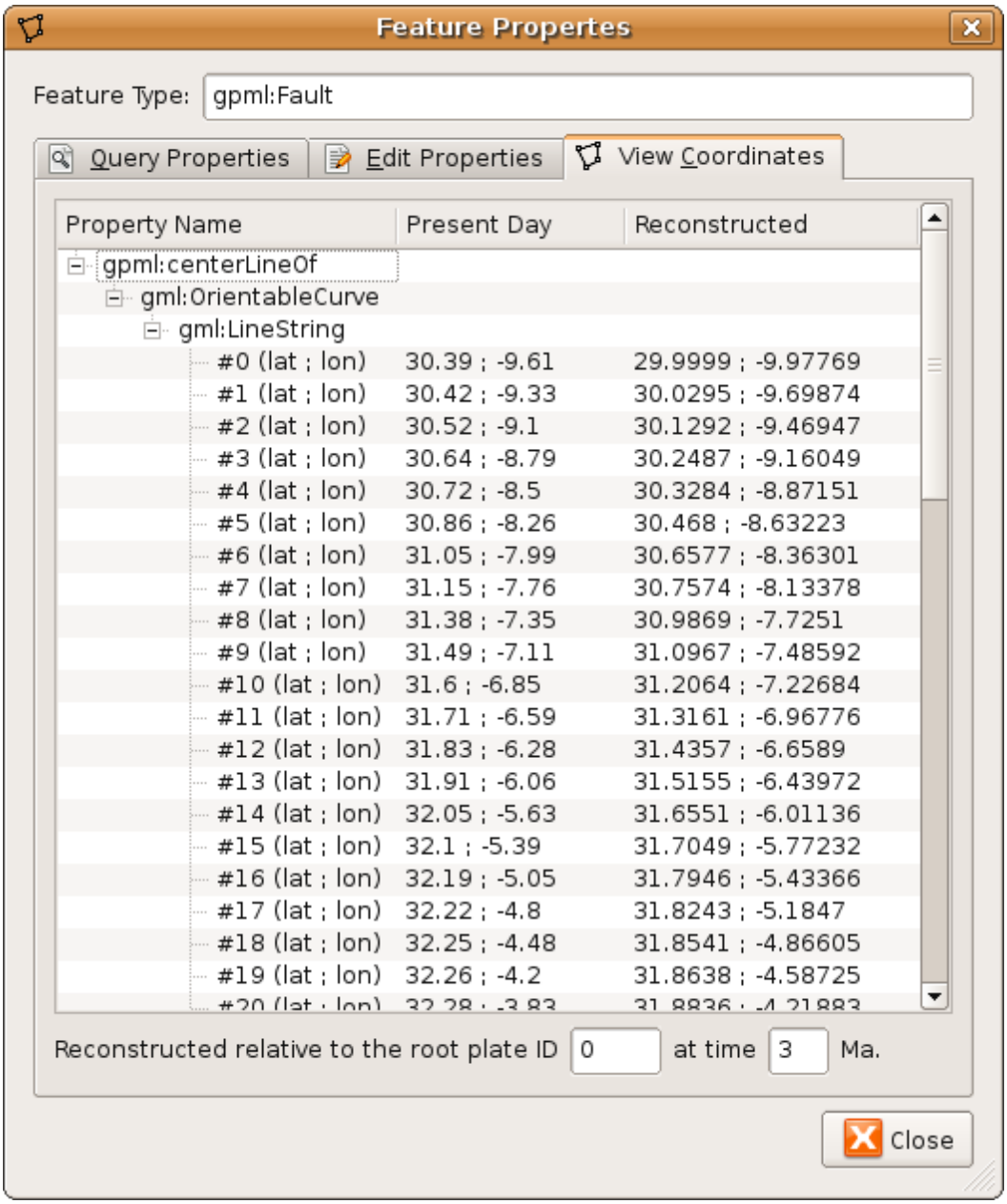


In the image above, the user has clicked on the down arrow of the combo box, and is selecting the "gpml:leftPlate" property. This property is used to annotate which regions are on either side of features such as a mid ocean ridge.



With the property name chosen, the lower section of the dialog presents the appropriate controls for entering the new value - in this case, a plate ID. Press Enter or the OK button to confirm the addition of the new property.

2.7. Viewing Coordinates



The View Coordinates dialog provides a tree view summarising the coordinates of every geometry in the feature.

The **Property Name** column lists the names and types of geometry, plus an enumeration of each coordinate. The **Present Day** column lists the coordinates of the geometry as it appears in the present, i.e. 0 Ma. The **Reconstructed** column lists the coordinates of the geometry as they appear on screen at the current view time, which for convenience is displayed at the bottom of the dialog.

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More on Reconstructions

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1. Theory

GPlates enables the user to visualise (and interactively manipulate the visualisation) of plate motions through time; plate-tectonic reconstructions-calculations of the probable positions, orientations and motions of tectonic plates at various points in time, based upon geological measurements of the relative (plate-to-plate) positions of various plates at specific times in the past, dictate plate motions, (J.Boyden, 2006).

FIXME: that last sentence was hueg. In fact, I think this whole paragraph needs to be shot in the head.

1.1. Plate IDs

As discussed earlier in this documentation, GPlates uses the concept of a **Plate ID** to ascribe tectonic motion to a feature. All features using the same plate ID move in unison when reconstructed back through time. A plate ID is a non-negative whole number. Assigning specific meanings to specific plate IDs, such as making plate ID 714 correspond to northwest Africa, is up to the creator of the rotation file.

Plate IDs do not correspond to a physical tectonic plate, although they may represent the motion of features which are on that physical plate. Plate IDs can also be assigned to represent the motion of things on the same physical plate relative to one another - for example, the motion of an island arc caused by back-arc spreading. A subduction zone can be assigned one plate ID, and its associated island arc can be assigned another plate ID. The motion of both of these plate IDs can be anchored to a third plate ID, representing the global motion of the physical plate underneath the subduction zone and island arc.

1.2. Finite Rotations

Euler's Displacement Theorem tells us that any displacement on the surface of the globe can be modelled as a rotation about some axis. This combination of axis and angle is called a **finite rotation**. Finite rotations are used by GPlates as the elementary building blocks of plate motion.

1.3. Total Reconstruction Poles

Total Reconstruction Poles tie finite rotations to plate motion. A total reconstruction pole is a finite rotation which "reconstructs" a plate from its present day position to its position at some point in time in the past. It is expressed as the combination of a "fixed" plate id, a "moving" plate id, a point in time and a finite rotation.

Reconstructions are defined in a relative fashion; A single total reconstruction pole defines the motion of one plate id (the "moving" plate id) relative to another (the "fixed" plate id) at a specific moment in geological time. A sequence of total reconstruction poles is needed in order to fully model the motion of one particular plate across the surface of the globe throughout time.

1.4. Fixed Reference Plate ID

A sequence of total reconstruction poles is used to models the motion of a single plate across the surface of the globe. The total reconstruction poles describe the relative motion between each plate, but ultimately this motion has to be traced back to a single plate ID which is considered "fixed". GPlates calls this the

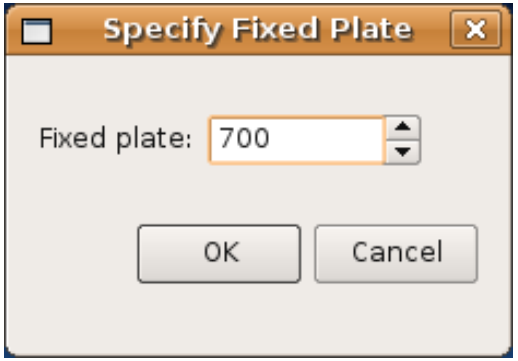
Fixed Reference Plate ID. Generally, this plate ID corresponds to an absolute reference frame, such as a hotspot, paleomagnetic, or mantle reference frame. The convention is to assign the fixed reference plate ID to 000, but GPlates allows any plate ID to be used as the fixed reference plate ID.

1.5. The Rotation Hierarchy

To create the model of global plate rotations that is used in GPlates, total reconstruction poles are arranged to form a hierarchy, or tree-like structure. At the top of the hierarchy is the globally fixed reference plate ID. Successive plate IDs are further down the chain, linked by total reconstruction poles. To calculate the absolute rotation of a plate ID (relative to the fixed reference, at a given time), GPlates starts at that point in the hierarchy and works its way up to the top - to the root of the tree.

2. Specify Fixed Plate

The **Specify Fixed Plate** command on the Reconstruction menu can be used to change which plate ID GPlates uses as the globally fixed reference plate ID. Enter a new plate ID in the dialog that pops up, and GPlates will automatically rearrange the rotation hierarchy so that the specified plate is at the top.

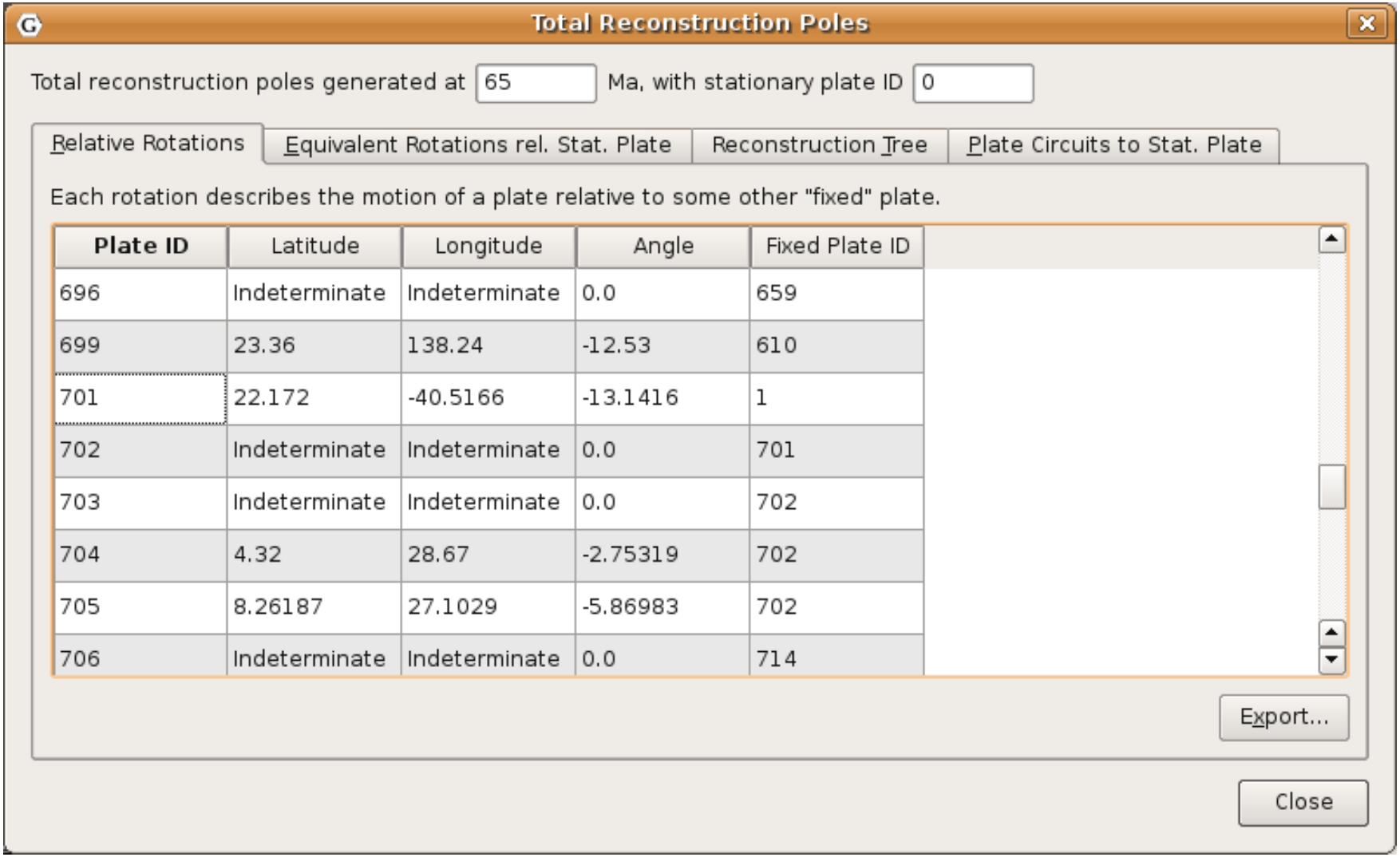


3. Reconstruction Pole Dialog

The Total Reconstruction Pole Dialog is accessed from the Reconstruction menu. It contains four tables of information, relevant to the current reconstruction time and the current globally fixed plate ID.

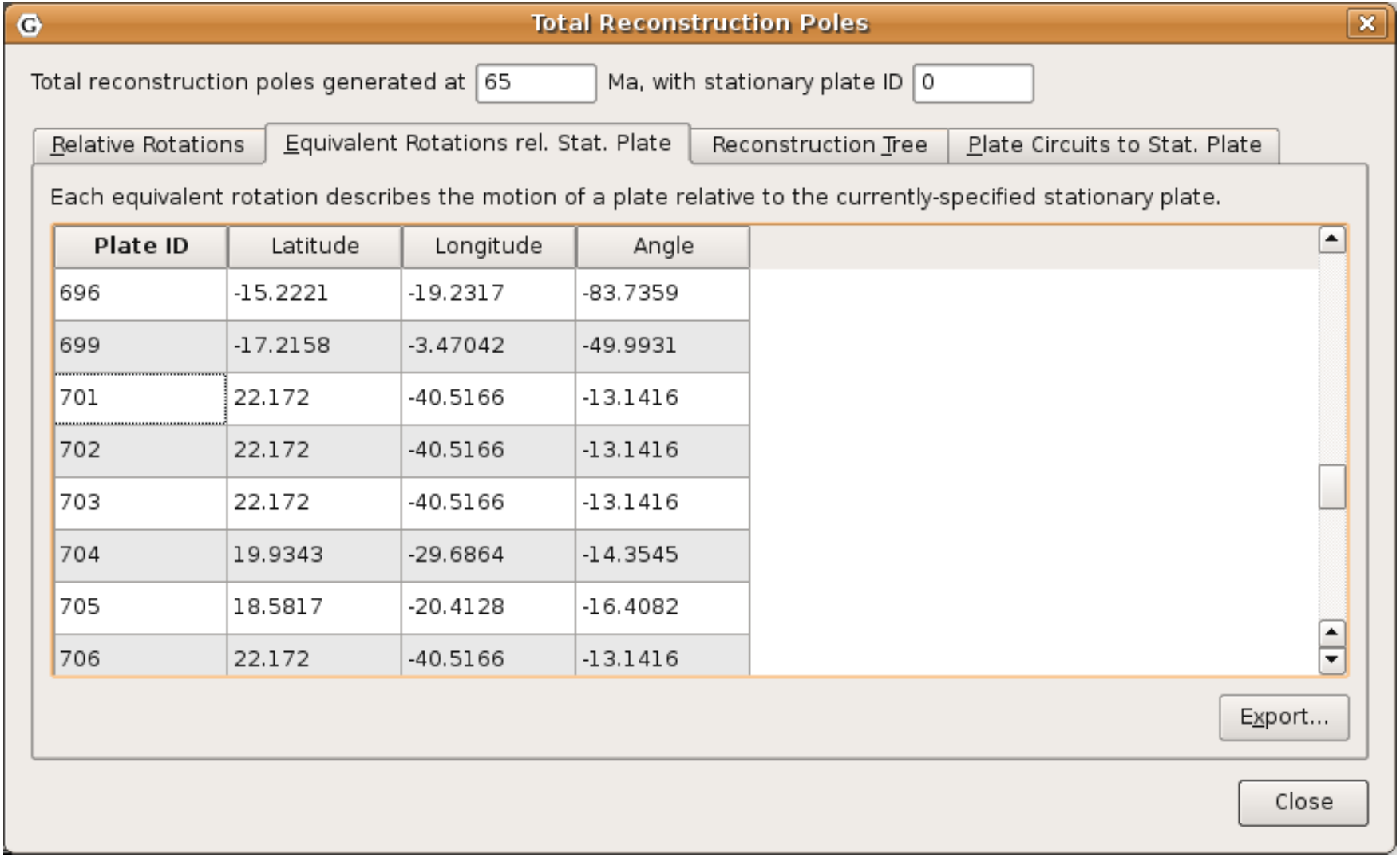
3.1. Relative Rotations

This table lists all the total reconstruction poles in terms of the relative motions between plates, for the current reconstruction time.


Total Reconstruction Poles
Total reconstruction poles generated at 65 Ma, with stationary plate ID 0
Relative Rotations
Equivalent Rotations rel. Stat. Plate
Reconstruction Tree
Plate Circuits to Stat. Plate
Each rotation describes the motion of a plate relative to some other "fixed" plate.
Plate ID | Latitude | Longitude | Angle | Fixed Plate ID
696 | Indeterminate | Indeterminate | 0.0 | 659
699 | 23.36 | 138.24 | -12.53 | 610
701 | 22.172 | -40.5166 | -13.1416 | 1
702 | Indeterminate | Indeterminate | 0.0 | 701
703 | Indeterminate | Indeterminate | 0.0 | 702
704 | 4.32 | 28.67 | -2.75319 | 702
705 | 8.26187 | 27.1029 | -5.86983 | 702
706 | Indeterminate | Indeterminate | 0.0 | 714
Export...
Close

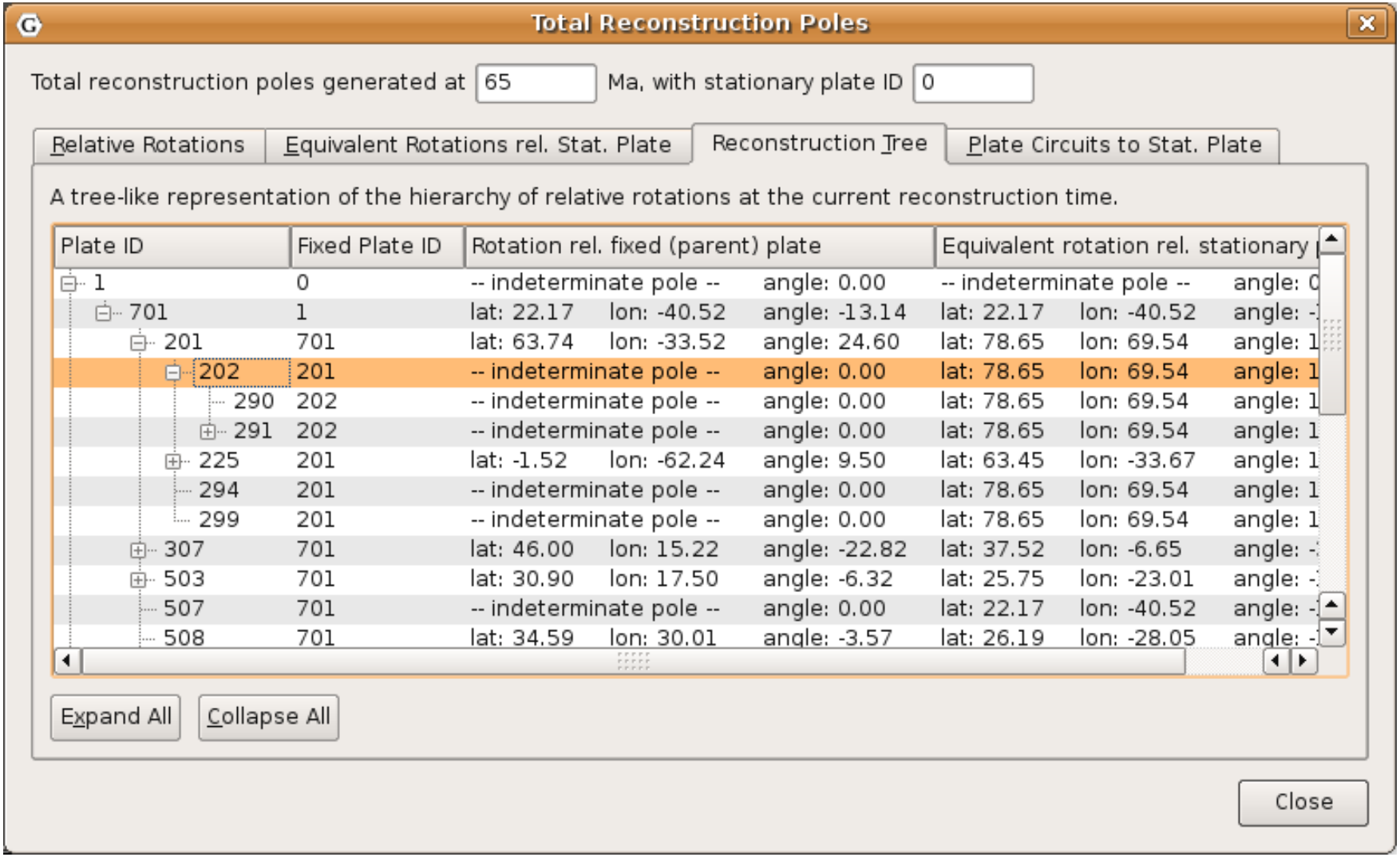
3.2. Equivalent Rotations Relative To Stationary Plate

Similar to the **Relative Rotations** table, this lists rotations for each plate. However, the data presented here has been converted from individual relative rotations into the equivalent absolute rotation, relative to the fixed reference plate ID. Again, these apply to the current reconstruction time.


Total Reconstruction Poles
Total reconstruction poles generated at 65 Ma, with stationary plate ID 0
Relative Rotations
Equivalent Rotations rel. Stat. Plate
Reconstruction Tree
Plate Circuits to Stat. Plate
Each equivalent rotation describes the motion of a plate relative to the currently-specified stationary plate.
Plate ID | Latitude | Longitude | Angle
696 | -15.2221 | -19.2317 | -83.7359
699 | -17.2158 | -3.47042 | -49.9931
701 | 22.172 | -40.5166 | -13.1416
702 | 22.172 | -40.5166 | -13.1416
703 | 22.172 | -40.5166 | -13.1416
704 | 19.9343 | -29.6864 | -14.3545
705 | 18.5817 | -20.4128 | -16.4082
706 | 22.172 | -40.5166 | -13.1416
Export...
Close

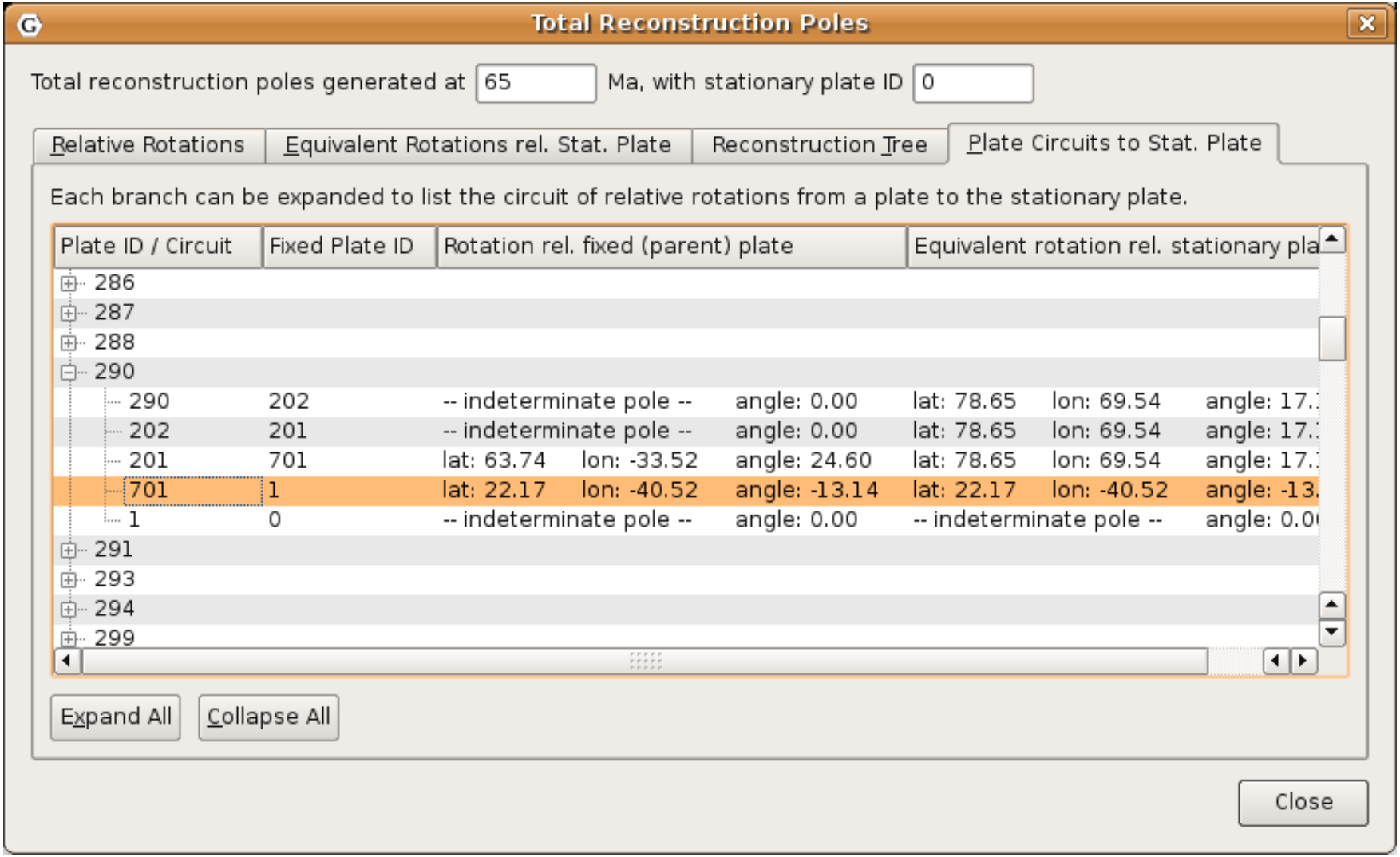
3.3. Reconstruction Tree

Here the reconstruction hierarchy is presented in a more natural, tree-like form. Relative rotations are listed, but individual nodes of the tree (plate IDs) can be expanded or collapsed, to explore the branches of the plate rotation model.


Total Reconstruction Poles
Total reconstruction poles generated at 65 Ma, with stationary plate ID 0
Relative Rotations
Equivalent Rotations rel. Stat. Plate
Reconstruction Tree
Plate Circuits to Stat. Plate
A tree-like representation of the hierarchy of relative rotations at the current reconstruction time.
Plate ID
Fixed Plate ID
Rotation rel. fixed (parent) plate
Equivalent rotation rel. stationary
1 0 -- indeterminate pole -- angle: 0.00 -- indeterminate pole -- angle: 0
701 1 lat: 22.17 lon: -40.52 angle: -13.14 lat: 22.17 lon: -40.52
201 701 lat: 63.74 lon: -33.52 angle: 24.60 lat: 78.65 lon: 69.54
202 201 -- indeterminate pole -- angle: 0.00 lat: 78.65 lon: 69.54
290 202 -- indeterminate pole -- angle: 0.00 lat: 78.65 lon: 69.54
291 202 -- indeterminate pole -- angle: 0.00 lat: 78.65 lon: 69.54
225 201 lat: -1.52 lon: -62.24 angle: 9.50 lat: 63.45 lon: -33.67
294 201 -- indeterminate pole -- angle: 0.00 lat: 78.65 lon: 69.54
299 201 -- indeterminate pole -- angle: 0.00 lat: 78.65 lon: 69.54
307 701 lat: 46.00 lon: 15.22 angle: -22.82 lat: 37.52 lon: -6.65
503 701 lat: 30.90 lon: 17.50 angle: -6.32 lat: 25.75 lon: -23.01
507 701 -- indeterminate pole -- angle: 0.00 lat: 22.17 lon: -40.52
508 701 lat: 34.59 lon: 30.01 angle: -3.57 lat: 26.19 lon: -28.05
Expand All
Collapse All
Close

3.4. Plate Circuits To Stationary Plate

This tab of the Total Reconstruction Poles dialog can be used to trace a series of total reconstruction poles from any given plate ID back to the top of the hierachy, the fixed reference plate ID. It is useful to quickly identify the other plate IDs that a chosen plate ID depends on.


Total Reconstruction Poles
Total reconstruction poles generated at 65 Ma, with stationary plate ID 0
Relative Rotations
Equivalent Rotations rel. Stat. Plate
Reconstruction Tree
Plate Circuits to Stat. Plate
Each branch can be expanded to list the circuit of relative rotations from a plate to the stationary plate.
Plate ID / Circuit
Fixed Plate ID
Rotation rel. fixed (parent) plate
Equivalent rotation rel. stationary pla
286
287
288
290
290 202 -- indeterminate pole -- angle: 0.00 lat: 78.65 lon: 69.54 angle: 17.
202 201 -- indeterminate pole -- angle: 0.00 lat: 78.65 lon: 69.54 angle: 17.
201 701 lat: 63.74 lon: -33.52 angle: 24.60 lat: 78.65 lon: 69.54 angle: 17.
701 1 lat: 22.17 lon: -40.52 angle: -13.14 lat: 22.17 lon: -40.52 angle: -13.
1 0 -- indeterminate pole -- angle: 0.00 -- indeterminate pole -- angle: 0.0
291
293
294
299
Expand All
Collapse All
Close

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Editing Geometries

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1. Geometries in GPlates

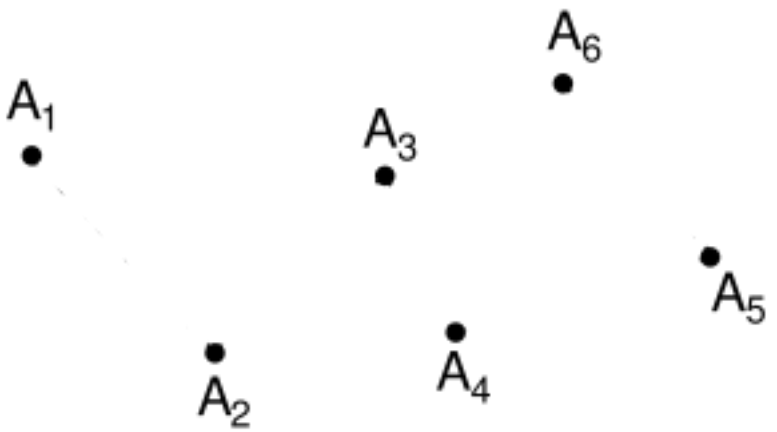
The geometries which GPlates handles are point, multi-point, polyline and polygon. Certain types of features contain different geometries, for example: a volcano uses a point to represent its position; a multi-point is used to represent a field of points which all have the same properties; an Isochron uses a polyline to represent its centre-line; and a basin uses a polygon to represent its outline.

1.1. Point

A point is the most basic form of geometry in GPlates and the basis of all other geometries.

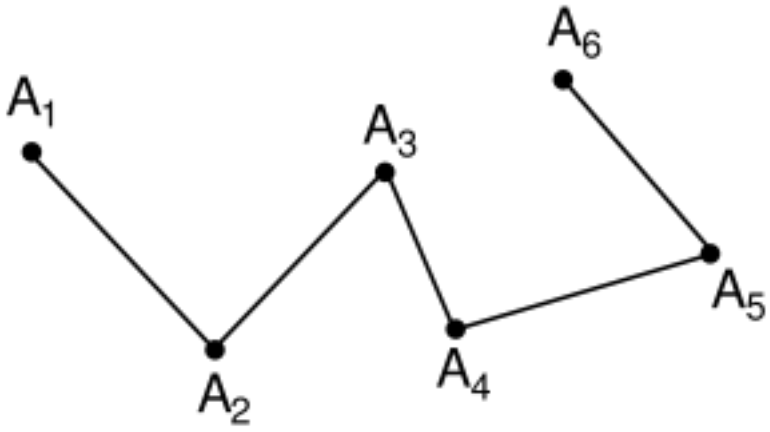
1.2. Multi-point

A collection of points that move as one.



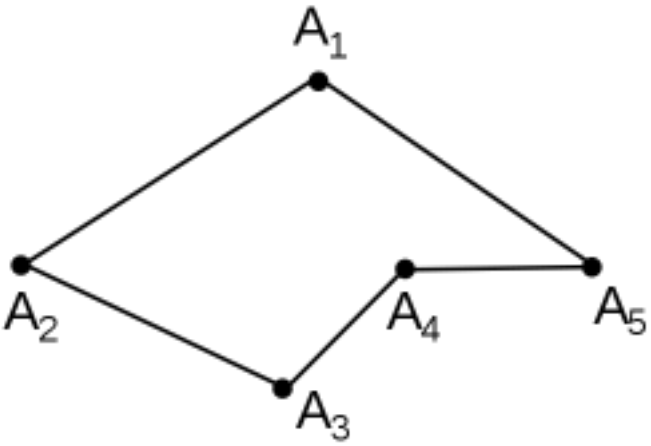
1.3. Polyline

A series of lines drawn end-to-end, forming an open polygon. It is assumed that the lines are non-intersecting. Sometimes in GPlates the direction of a polyline is important, when determining the properties on either side of the line; for example, one side of a subduction zone represents the subducting slab, while the other represents the overriding plate. The direction of a polyline is determined from the "start" of the polyline (the first point digitised) to the "end" of the polyline.



1.4. Polygon

A series of lines drawn end-to-end, forming a closed shape. It is assumed that the lines are non-intersecting.



2. Geometry-Editing Tools

The geometry-editing tools are **Canvas Tools** and can be found in the **Tool Palette**. To begin editing geometries it is first necessary to select the feature using the **Choose Feature Tool**,

.

- The **Geometry Editing Tools** can only be used on the currently chosen feature.

2.1. Move Vertex Tool

Once you have selected a feature, its properties will appear in the **Current Feature Panel**. Little dots will appear on the chosen feature geometry, representing the vertices and can be positioned to a new location. The changes made to the geometry are immediate and there is no need to press an "Apply" button.

- This tool is useful for correct mistakes in the features' geometry.

2.2. Insert Vertex Tool

If the current geometry is a polyline or polygon, when the user clicks on a line, a new vertex is inserted at that position on that line. This vertex may then be dragged to a new position, using the move vertex tool.

If the current geometry is a multi-point, a new point will be created at the click-position.

2.3. Remove Vertex Tool

If the current geometry is a polyline or polygon, when the user clicks on an existing vertex, that vertex will be deleted. The vertices on either side of the removed vertex will now be connected directly, creating a new polyline or polygon. In the case of multi-point geometry, when the user clicks on an existing point, the point will be removed.

- Note that if a vertex is removed from a polygon, the resulting geometry will still be a closed polygon, as long as there are sufficient remaining vertices. GPlates requires at least three distinct points to define a polygon. If there are only two distinct points remaining, the geometry will become a polyline.

- Note that if a vertex is removed from a polyline, the resulting geometry will still be a single continuous polyline, as long as there are sufficient remaining vertices. GPlates requires at least two distinct points to define a polyline. If there is only one distinct point remaining, the geometry will become a point.

- Note that if a vertex (i.e. point) is removed from a multi-point geometry which contains only two points, it will become a point geometry.

- It is invalid to remove a vertex from a single point geometry. In order to remove the geometry entirely the feature will have to be deleted.

3. In the Feature Properties Dialog

The controls for directly editing the coordinates used by geometry appears as a table with **Lat**, **Lon**, and **Actions** columns. Click a row of the table to select it, and the following action buttons will appear:

Insert a new row above

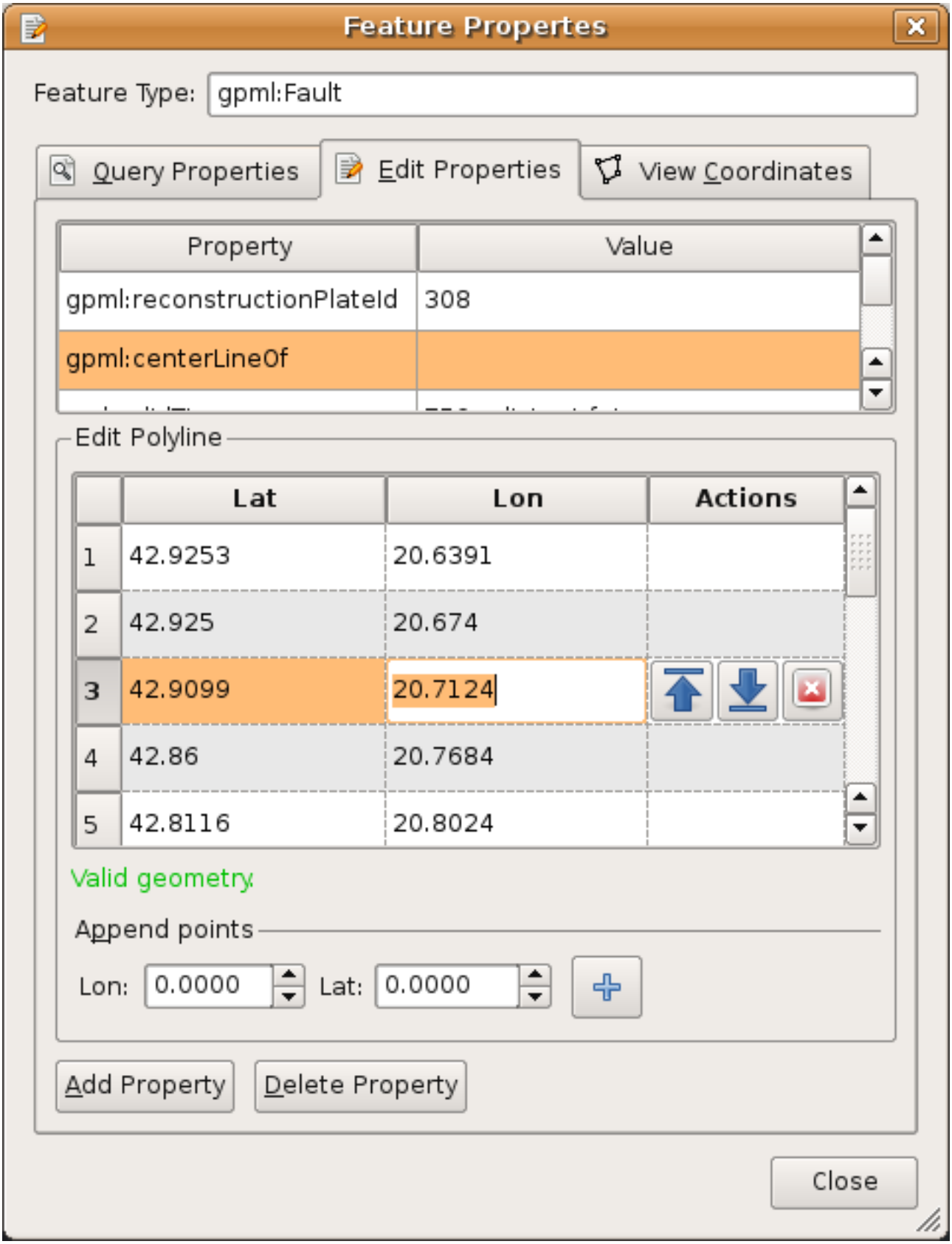
Insert a new row below

Delete row

- Double-clicking an entry in the table lets you edit a coordinate directly.
    - The **Valid Geometry** line will indicate if the coordinates in the table can be turned into correct geometry. It will indicate an error if there is something invalid about the coordinates, such as a lat/lon of 500 or similar.
- The "Append Points" spin-boxes are designed to be a convenient means of data entry, if you need to enter some points from a hard copy source.
    - Click in the **Lon** to start entering new coordinates. Type in a lon value, press **TAB**,

type in a **lat** value, press **TAB** (to move to the "+" button), press **SPACE** to activate that button. The new coordinate line will be added to the table, and GPlates will prepare to receive the next line of input.

- Selecting a property from the table and selecting **Delete** will delete the property from the feature.



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Creating New Features

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This chapter aims to provide the reader with information and instructions for creating digitising new features in GPlates.

1. Digitisation

GPlates allows the user to create features on the globe: from aseismic ridges to volcanoes. To create a new feature, a user first "digitises" a new geometry, then specifies the additional properties for that feature. The geometries which GPlates handles are point, polyline (a series of lines drawn end-to-end, forming an open polygon) and polygon. Certain types of features require certain geometries, for example: a volcano uses a point to represent its position; an isochron uses a polyline to represent its center-line; and a basin uses a polygon to represent its outline.

1.1. Digitisation Tools

GPlates offers three digitisation tools in the **Tool Palette**:

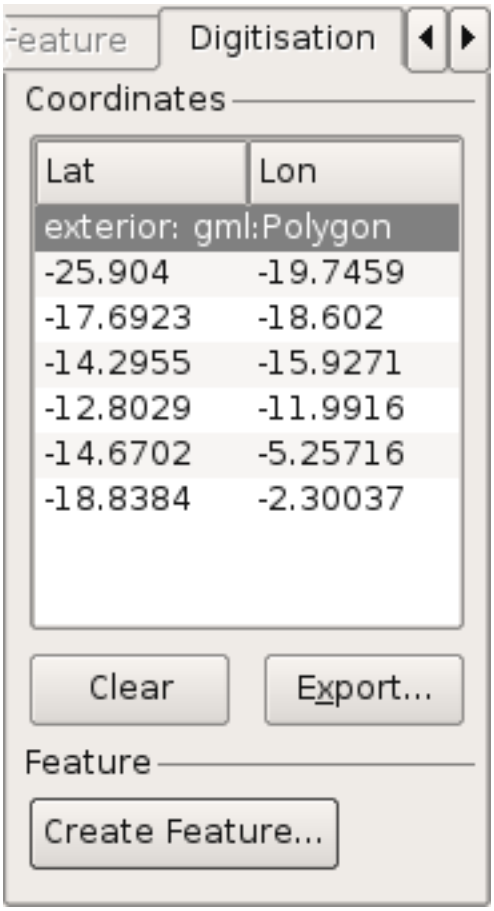
Polyline Geometry

Point Geometries

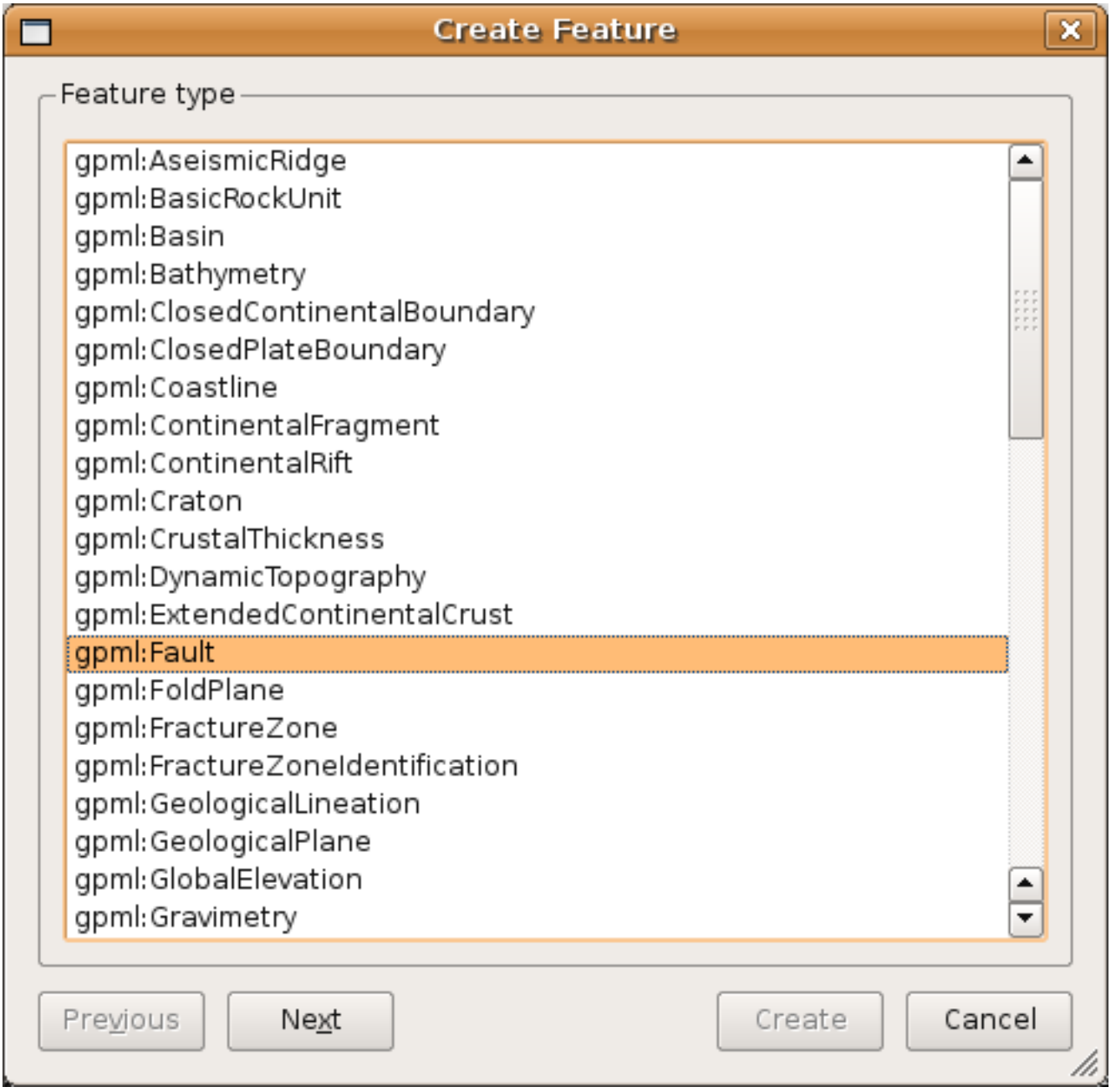
Polygon Geometry

Each tool can be used to create any of the GPlates GPML features, however it is the user's responsibility to ensure that the correct geometry is digitised for the intended feature type.

After choosing a geometry tool, you can begin adding control points to the globe by clicking on an area; these points define the geometry (feature) you want to create. (You can still rotate the globe by holding down the Ctrl key.) After you have plotted the feature, the latitude and longitude can be verified in the digitisation panel.

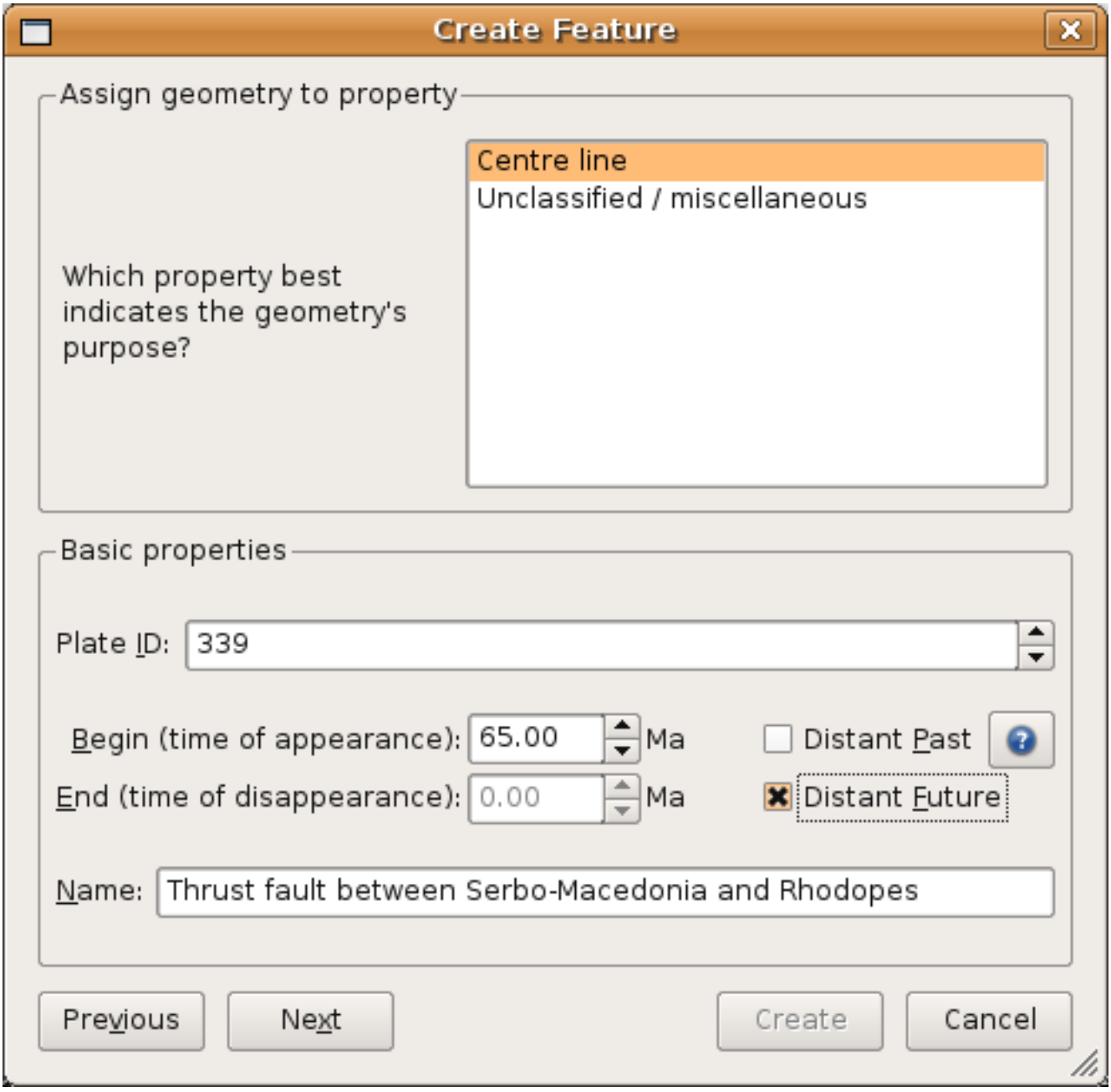


Once you are satisfied with the new feature location, click **Create Feature** button to select the type of feature you would like to create. E.g Isochron, Fault, Mid Ocean Ridge etc.

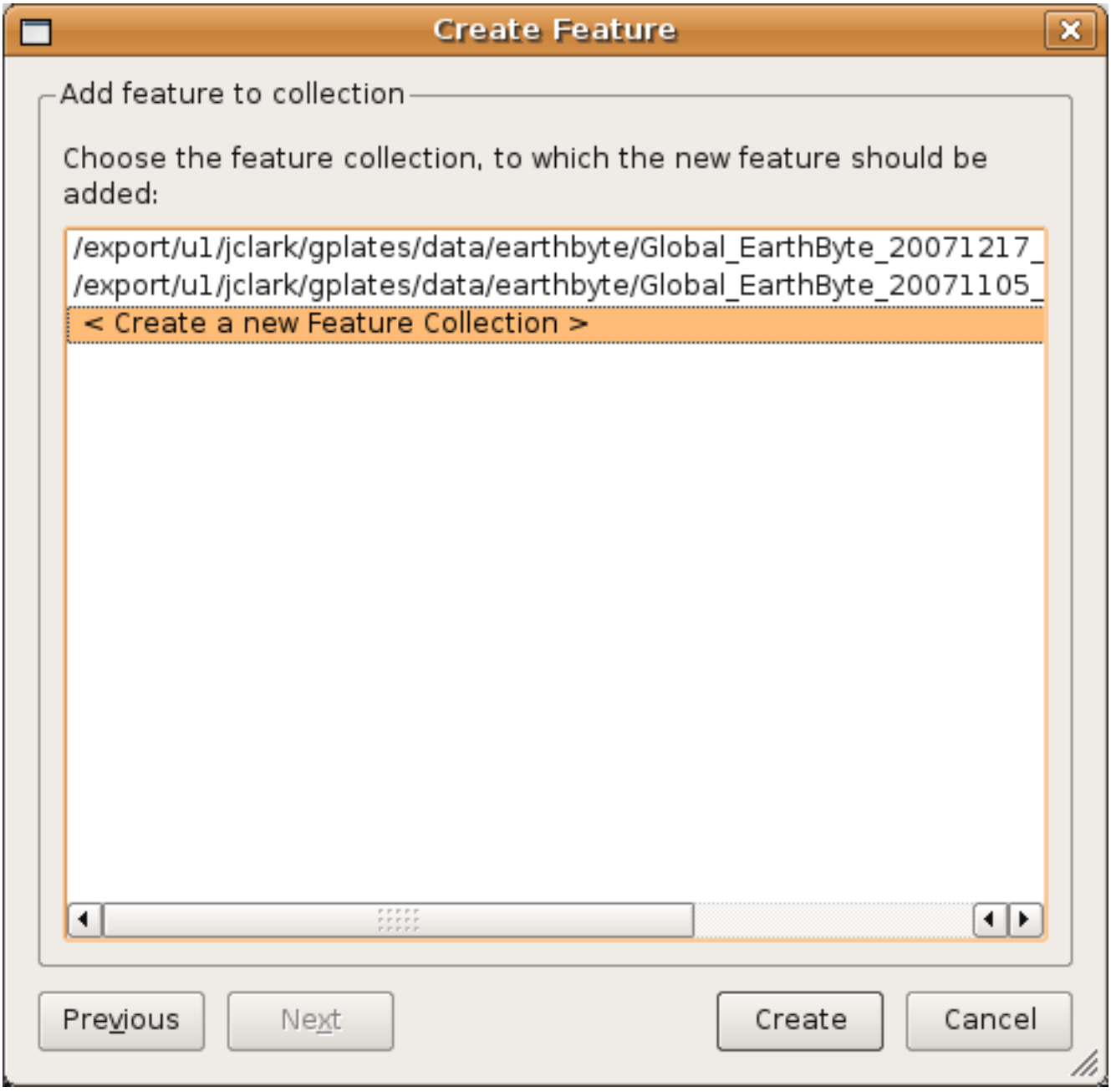


The next step is to assign a geometry to the feature as well as:

- Plate ID
- A beginning time for the feature
- An ending time
- A name (To help you distinguish/classify your feature)



In the final step of feature creation, the feature is assigned to a feature collection. All data files that are currently loaded in GPlates will be listed here, as well as the **< New Feature Collection >** option. Choosing any one of the existing feature collections and clicking **Create** will add the newly digitised feature to that collection and return the user to the GPlates main window.



If the **< New Feature Collection >** option is selected, a new feature collection will be created to hold the new feature. This feature collection will not yet have a name, and is not associated with a file on disk. Like all other feature collections, the new one will be found in the **Manage Feature Collections** dialog.

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